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PENNSYLVANIA
GEOLOGICAL SURVEY
FOURTH SERIES
BULLETIN M 6

BITUMINOUS COAL FIELDS
OF
PENNSYLVANIA
PART II

Detailed Description of Coal Fields

by

JAMES D. SISLER, Associate Geologist

Department of Forests and Waters
R. Y. Stuart, Secretary

Topographic and Geologic Survey
G. H. Ashley, State Geologist

Harrisburg, Pennsylvania
1926

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LETTER OF TRANSMITTAL.

R. Y. Stuart, Secretary,
Department of Forests and Waters.

SIR:

I have the honor to transmit herewith manuscript, maps, and illustrations for Part II of an introductory report on the Bituminous Coal Fields of Pennsylvania. This part is by Mr. James D. Sisler. It represents the cumulative results of many years' work. It gives a brief resumé of the stratigraphy, structure, and distribution of the coal beds by counties. Part I, giving general facts regarding the origin, character of coal, and coal beds, by myself, is nearly ready for transmission. Part III, coal analyses, has already been printed. Part IV, the bituminous coal reserves of Pennsylvania, is nearly completed.

Yours very truly,

Geo. H. Ashley

State Geologist.

Bindery

May 25, 1925.

255106

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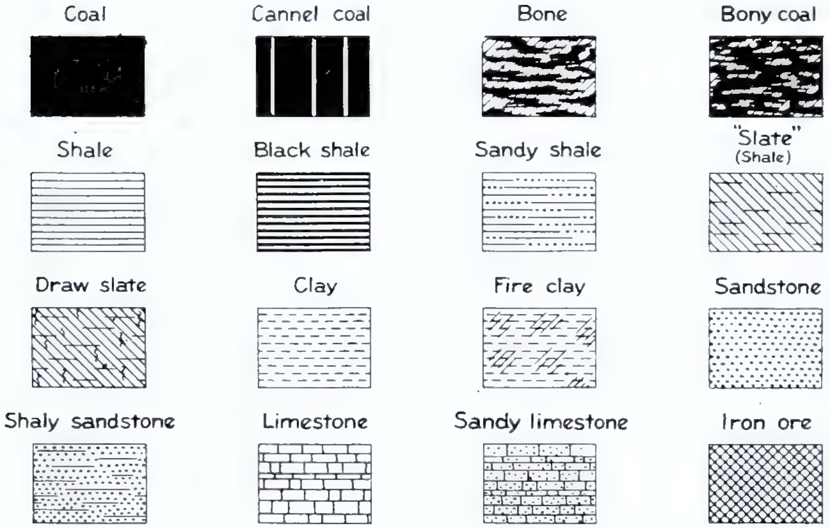

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Barges of bituminous coal in Monongahela River at Pittsburgh.

BITUMINOUS COAL FIELDS OF PENNSYLVANIA

Detailed Description of Coal Fields

By James D. Sisler.

PREFACE.

The following report is the result of many months' field and office work by the writer in the bituminous coal fields of Pennsylvania. During this period several hundred mines were visited and the physical characteristics of the coal were observed. The information contained in this report, however, is not entirely that collected by the writer, but is a combination of information from a great many sources.

The State Mine Inspectors, at the request of Joseph J. Walsh, Secretary of the Department of Mines, filled out mine description sheets describing the characteristics of the coal and associated rocks in each working mine in their district. Approximately 2,100 descriptions were received from these sources.

In compiling this coal report it was found that the information is not equally distributed among the counties. Some counties have been mapped in detail, others but roughly. In localities where detailed information is lacking many facts were used from the mine inspectors' reports, which include mine locations, names of coal beds, and their thickness.

Much credit is due to the mine inspectors for the quantity of excellent information which they prepared for this Survey.

This Survey has made a very serious effort to collect records of all holes drilled in testing for coal, oil, and gas. Several hundred of these records are now on file in the office of the Survey, and they are a most excellent source of information in correlating the various coal beds. These records were used in the discussion of coal beds in this report.

Many volumes of the Pennsylvania Second Geological Survey have been studied in detail, and in certain localities where the correlation of coal beds is known to be accurate, numerous sections from these old reports have been incorporated in this.

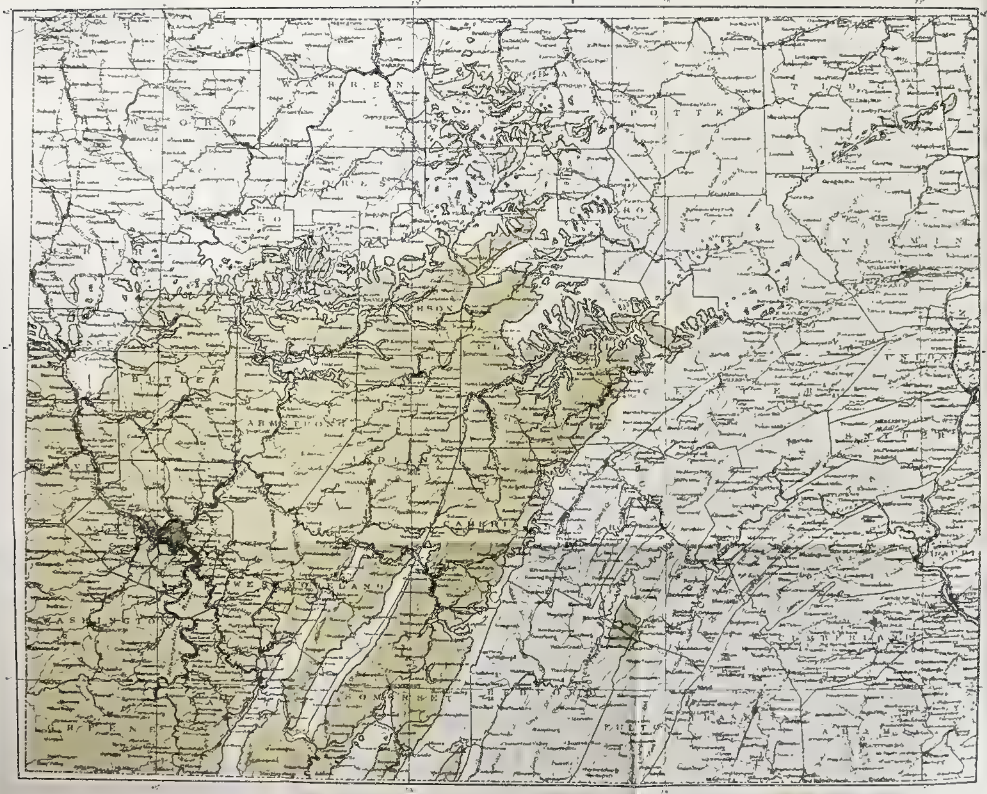
The primary purpose of this report is to place before the public the first comprehensive description of the bituminous coal fields in Pennsylvania. It is hoped that this report will be of much value to laymen for whom it was principally written. The engineer will find it so constructed that he can turn to definite information in a certain locality without leafing through many pages of separate volumes.

The accuracy of the information concerning the coal beds in various counties is not uniform. In some counties, such as Somerset, Cambria, Westmoreland, Allegheny, Washington, and Greene, practically all of the information is strictly reliable; in others, such as Armstrong, Jefferson, Elk, Cameron, Clinton, etc., the correlations of the coal beds are tentative, and in many instances the correlations of the operators have been used. The writer realizes that there are some mistakes in the volume and that many omissions have been necessary; he knows too that when these areas are mapped geologically in detail, numerous changes in the correlation of the coal beds will probably be made.

A great number of correlations in this volume have been made from drill hole records and from maps. Necessarily some of these correlations are wrong, but if there is a reasonable doubt as to the correlation it is so stated in the discussion.

The writer wishes to express his sincere appreciation of the manner in which the engineers in the bituminous coal mining districts of Pennsylvania, the coal operators, and the State Mine Inspectors have cooperated in giving information which has contributed greatly to the value of this report.

The photographs in this publication were furnished by the United States Bureau of Mines.

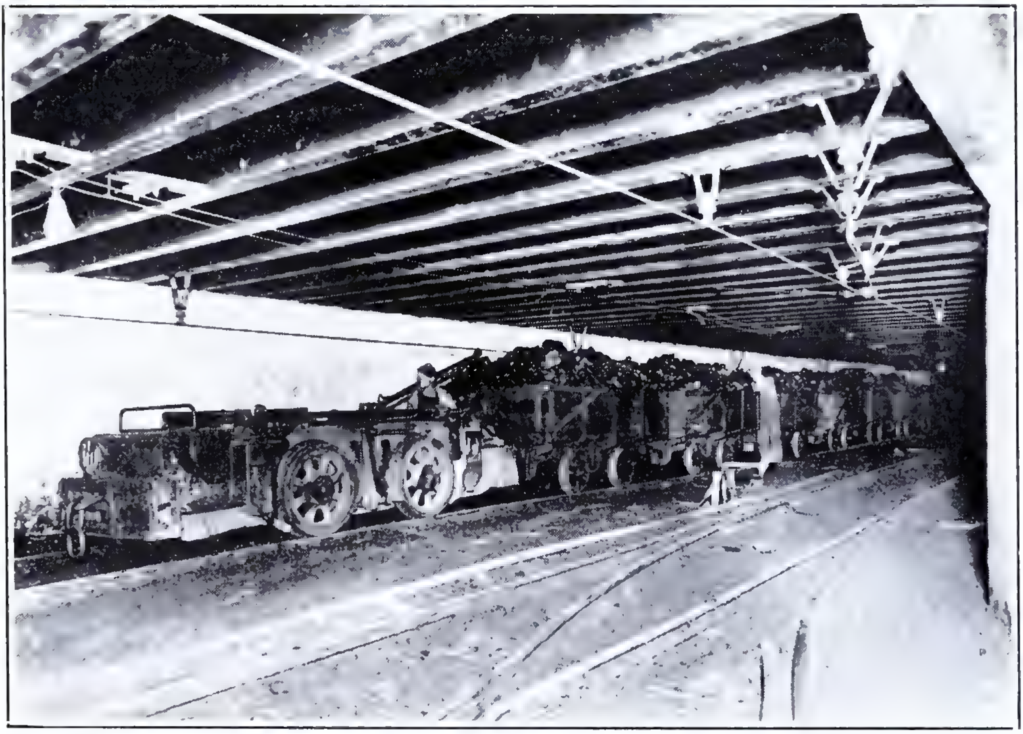


MAP OF LOWER KITTANNING COAL

▨ LOWER KITTANNING COAL

PLATE VIII

A. Modern surface plant at a shaft mine in Allegheny County.



B. Main haulageway in Allegheny County coal mine.

CHAPTER I.

ALLEGHENY COUNTY.

INTRODUCTION.

The earliest record of bituminous coal mining in Pennsylvania is that of 1760, when, according to Captain Thomas Hutchins, a coal mine was opened on Monongahela River, opposite Fort Pitt, now Pittsburgh. From that date production grew, and Allegheny County was the largest producer of bituminous coal in Pennsylvania for many years. At the present time, the largest factor in that production, the Pittsburgh coal, is rapidly approaching exhaustion in Allegheny County. However, the county has a large reserve of Thick Freeport coal, and the Kittanning coals, which have hardly been touched.

There are about thirty coal beds in the county, most of which are only a few inches thick. The Pittsburgh and the Thick Freeport beds are the most valuable at the present time. The Sewickley, Redstone, and Kittanning coals are locally workable. The others are thin and only locally valuable at present.

Allegheny County has most excellent transportation facilities, both by water and by rail. The Allegheny, Monongahela, and Ohio rivers are navigable, and railroads radiate from Pittsburgh in all directions.

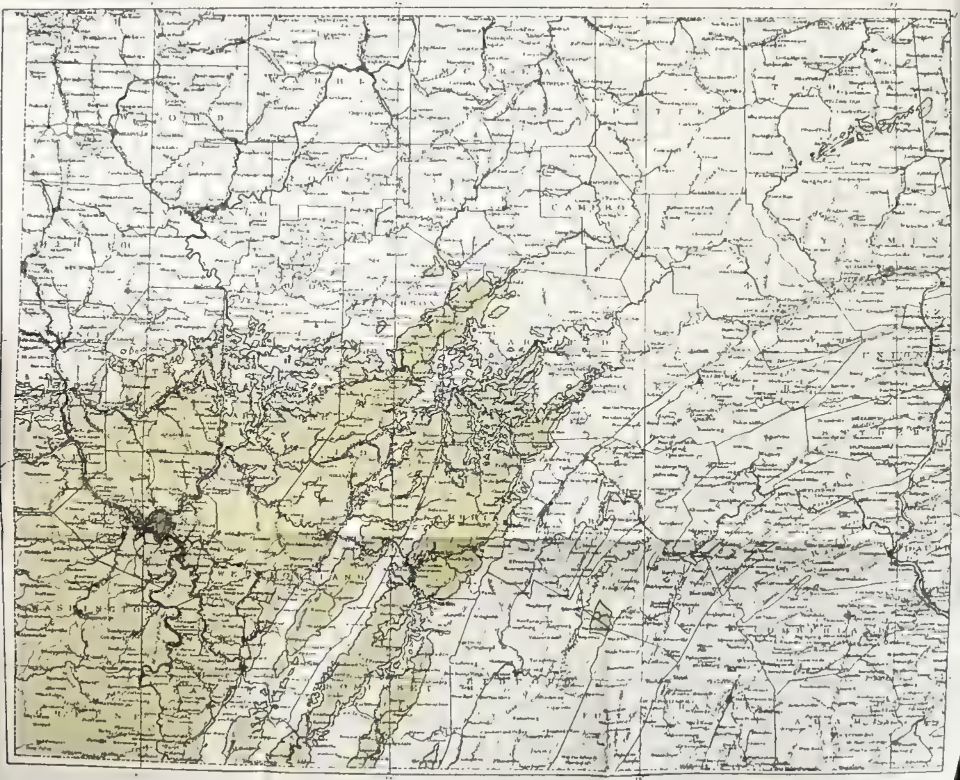
Coal was first shipped from Pittsburgh in 1803, when the *Louisiana* was ballasted with coal that was sold at Philadelphia for 37½ cents per bushel. The great growth of the river coal trade began with the completion of the Monongahela Navigation Company's system of locks to Brownsville in 1844. Now the Monongahela and Ohio rivers are used extensively for transporting coal by barge to the trade centers down the Ohio. This is the cheapest transportation method in the State.

The wonderful prosperity of Allegheny County as a manufacturing center is primarily due to its ideal geographic location, and to the large quantity of high-grade coal easily accessible within a short distance.

Allegheny County, being in a maturely dissected region, is hilly. The principal streams have eroded their valleys to a fairly uniform grade, and the smaller branches have cut the uplands into hundreds of narrow ridges. In areas where thick sandstones predominate, the hillsides are steep and rugged, but where sandstone is the cap rock the tops of the hills are broad and flat. The rivers flow in narrow-bottomed valleys with occasional remnants of old valley floors forming terraces above them.

COMMONWEALTH OF PENNSYLVANIA
TOPOGRAPHIC AND GEOLOGIC SURVEY
GEORGE H. ASHLEY, STATE GEOLOGIST

BULLETIN M-6 PT. II PLATE III



MAP OF LOWER FREEPORT COAL

Scale [illegible]

[illegible] Miles

[illegible] Kilometers

▨ LOWER FREEPORT COAL

STRUCTURE.

There are eleven structural features in Allegheny County, each having a northeast-southwest trend, and affecting the position and mining of the coals. They are described in order from southeast to northwest.

Murrysville anticline enters Allegheny County at Lock No. 3 on Monongahela River, extends northeast, and leaves the county about 1 mile south of Trafford City. It is a well-defined fold, having rather steep dips on each flank, and an axis rising rapidly northeastward. This structure is the source of gas in the McKeesport field.

Duquesne syncline, lying northwest of Murraysville anticline, enters the county midway between Peters Creek and Monongahela River, and extends northeast through Duquesne and Turtle Creek. It is a narrow basin having gentle slopes on both flanks. The axis rises gently northeastward.

Amity anticline, lying northwest of Duquesne syncline, enters the county 1.5 miles east of Liberty, and extends northeast to Braddock and Verona. It is a well-developed fold with rather high dips on its flanks in the southern part of the county, but flattens out near Monongahela River.

McMurry syncline is the next structure to the northwest. It enters Allegheny County one mile west of Library, extends northeast near Broughton, and flattens out near Homestead. It is a pronounced fold in the southern part of the county, and has steep dips on its southeast flank; the dips on its west flank are gentle. The axis rises gradually northeastward.

Nineveh syncline and Chartiers Creek cross the county line at the same point, near Boyce. The axis runs north to Rosedale, turns east at the County Home, north through Woodville and Heidelberg, and passes between Duquesne Heights and West End, thence down the Ohio to Bellevue, where as a very minor fold it again turns northeast. Its axis pursues an irregular course, has several depressions, and rises gently to the northeast. The dips are gentle and regular on both flanks.

Wildwood anticline lies entirely in Allegheny County. Its northern end has not been mapped but the axis passes the mouth of North Fork of Pine Creek with a southwest course and plunge. One mile south of Nedsky it turns south for one mile, then almost due west. A minor spur shoots off to the southeast along Girty Run. The main axis forks in the northwest corner of Ross township. One fork of the anticline turns south and crosses Ohio River at Avalon. The other, with a level crest, runs west and south along Toms Run and crosses the river at Glenfield where the axis plunges very rapidly to the south, and becomes more and more obscure.

Mount Nebo syncline, lying northwest of Wildwood anticline, enters the county from the south at McDonald. It extends in an irregular northeast course to Coraopolis, crosses Ohio River at the west end of Neville Island, runs northeast to Nedsky, where it turns and runs approximately due north, and leaves the county two miles northeast of Brush Creek. The axis of the trough rises about 80 feet in the first mile north of the river, passes through the Mount Nebo oil field, pitches slightly to the bottom of a shallow basin 1.5 miles southeast of Ingomar, and from this point rises gradually to the north.

Brush Creek anticline is the most prominent fold in the northwestern part of the county. Its southern tip is at Coraopolis, from which point it extends in an irregular northeast direction near Bayne and Brush Creek, leaving the county one mile west of Mt. Pleasant Church. The axis rises rapidly northeast, and the dips on both flanks are steep.

Sewickley syncline lies west of Brush Creek anticline and branches off from the Mount Nebo syncline at Coraopolis. It passes through Sewickley, and thence north to Sewickley Creek just west of Hopkins Church. It is a prominent and clearly defined feature, with the axis rising rapidly northward.

Crows Run anticline lies west of Sewickley syncline. Its southern end is about three miles south of Glenwillard. The axis crosses Ohio River at Deadman Island near Leetsdale, and thence runs slightly east of north for several miles. The dips on both flanks are gentle.

West Middletown syncline lies near the western boundary of the county. It enters the county from the south near Murdocksville, and leaves it on the north just east of Ambridge, crossing the Ohio at Shousetown. It is a well defined trough in Washington County, but in Allegheny County is ill defined.

Panhandle trench is a peculiar swamp or small structural depression between Beadling and Hickman, in the southwestern part of the county.

STRATIGRAPHY.

The outcropping hard rocks of Allegheny County are the Washington, Monongahela, Conemaugh, and Allegheny groups of Carboniferous age.

Drill holes have reached below the Catskill group of Devonian age, but no workable coal beds were recorded below the Allegheny group.

The recent river deposits are unconsolidated silts, clays, and gravels deposited on flood plains.

Glacial deposits on the old river terraces in the northern part of the county are composed of poorly stratified beds of gravel, sand, and clay from 25 to 50 feet thick. Most of the pebbles are quartz, granite, and sandstone. The Carmichaels group consisting of clay, sand, and coarse boulders, is found on terraces along the Ohio and its tributary streams.

The Washington group is present only in a few isolated areas in the southern part of the county. It is composed of soft shaly sandstones, shales, a few thin limestones, and two thin coal beds.

The Monongahela group is present only in the southern part of the county. It is composed of sandstones, limestones, shales, and three workable coal beds, one being the Pittsburgh. The group has an average thickness of 330 feet.

The Conemaugh group has the most extensive outcrop in the county. It averages 625 feet thick, and is composed of grey, red, and greenish shales, sandstones, limestones, and a number of coal beds, some of which are workable.

The Allegheny group has a limited outcrop on Allegheny River, north of Pittsburgh. It is composed of massive sandstones, shales, thin limestones, and valuable beds of coal and clay. Its average thickness is 290 feet.*

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*In drafting the stratigraphic sections lack of space made it necessary to abbreviate the names of coal beds. The following abbreviations have been used.

Bak	Bakerstown
BakL	Bakerstown Lower
BakU	Bakerstown Upper
BenCr	Bens Creek
Ber	Berlin
Br	Brookville
BrCr	Brush Creek
Cl	Clarion
ClL	Clarion Lower
ClU	Clarion Upper
Cr	Craigsville
Dunk	Dunkard
Duq	Duquesne
EL	Elk Lick
Far	Farmington
Fr	Franklin
Gal	Gallitzin
Hag	Hager
Har	Harlem
Jolly	Jollytown
LCl	Little Clarksburg
LF	Lower Freeport
LK	Lower Kittanning
Lon	Lonaconing
LPgh	Little Pittsburgh
LWas	Little Washington
M or Mer	Mercer
Mah	Mahoning
MerL	Mercer Lower
MerU	Mercer Upper
MK	Middle Kittanning
Nin	Nineveh
Pgh	Pittsburgh
PghR	Pittsburgh rider
Qr	Quakertown
Red	Redstone
Scbgr	Scrubgrass
Sew	Sewickley
Sh	Sharon
TenM	Tenmile
Ti	Tionesta
UF	Upper Freeport
UFR	Upper Freeport rider
UK	Upper Kittanning
Unt	Uniontown
Was	Washington
WasA	Washington A
Wbg	Waynesburg
WbgA	Waynesburg A
Welbg	Wellersburg

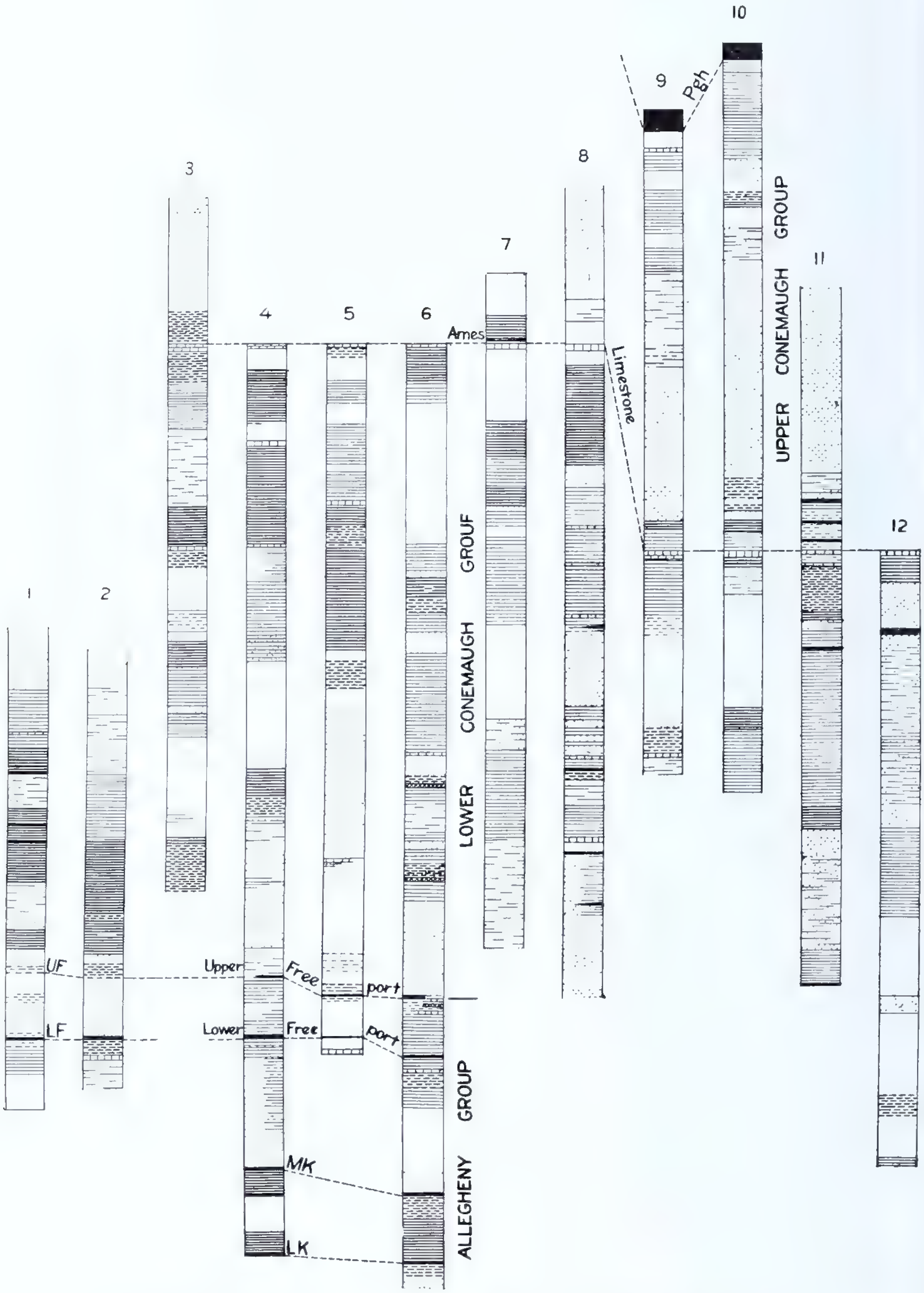

Figure 1. Stratigraphic sections, Allegheny County.

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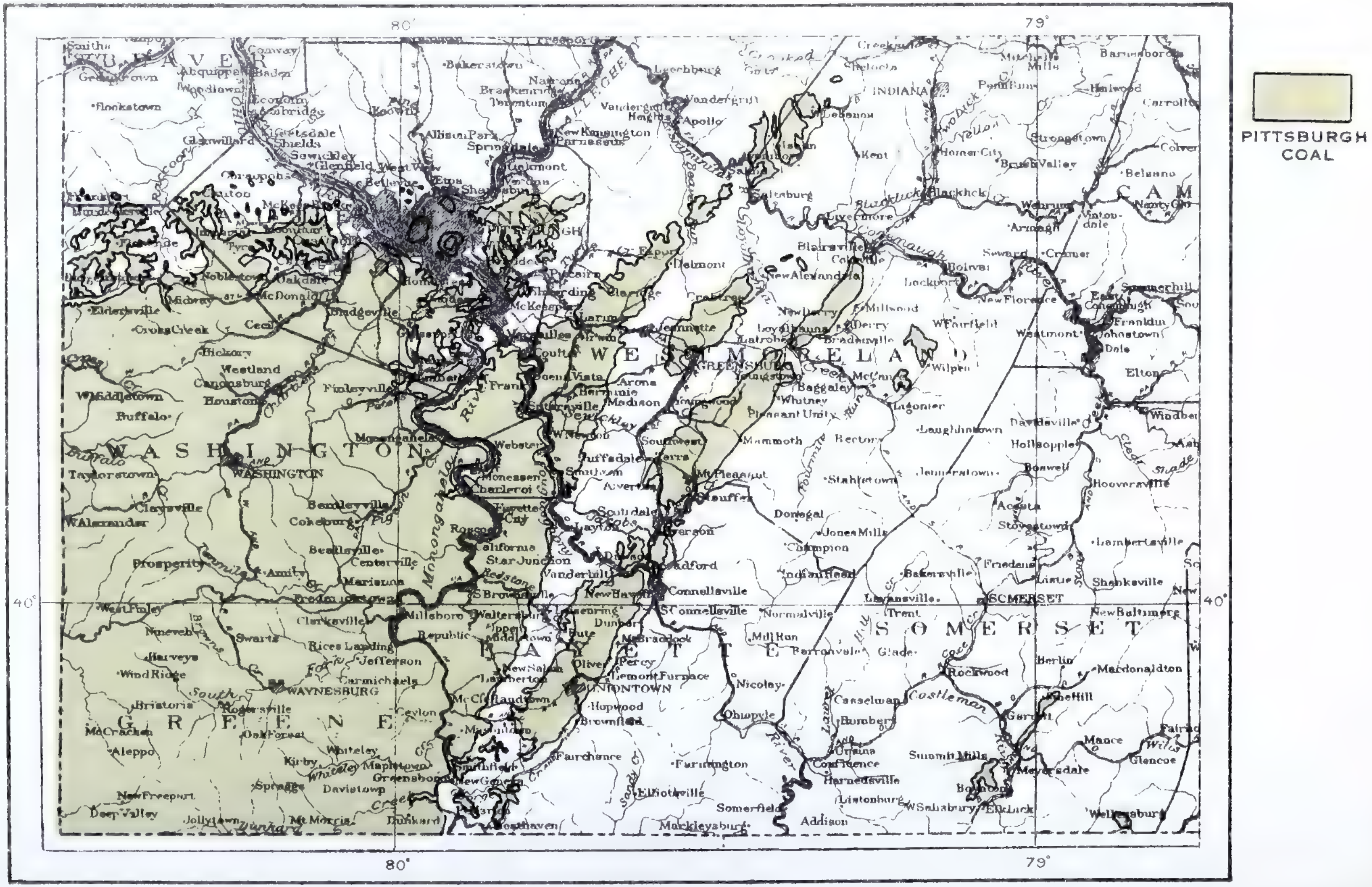
TOPOGRAPHIC AND GEOLOGIC SURVEY
GEORGE H. ASHLEY, STATE GEOLOGIST

BULLETIN M-6 PT. II PLATE IV



MAP SHOWING AREA UNDERLAIN BY PITTSBURGH COAL

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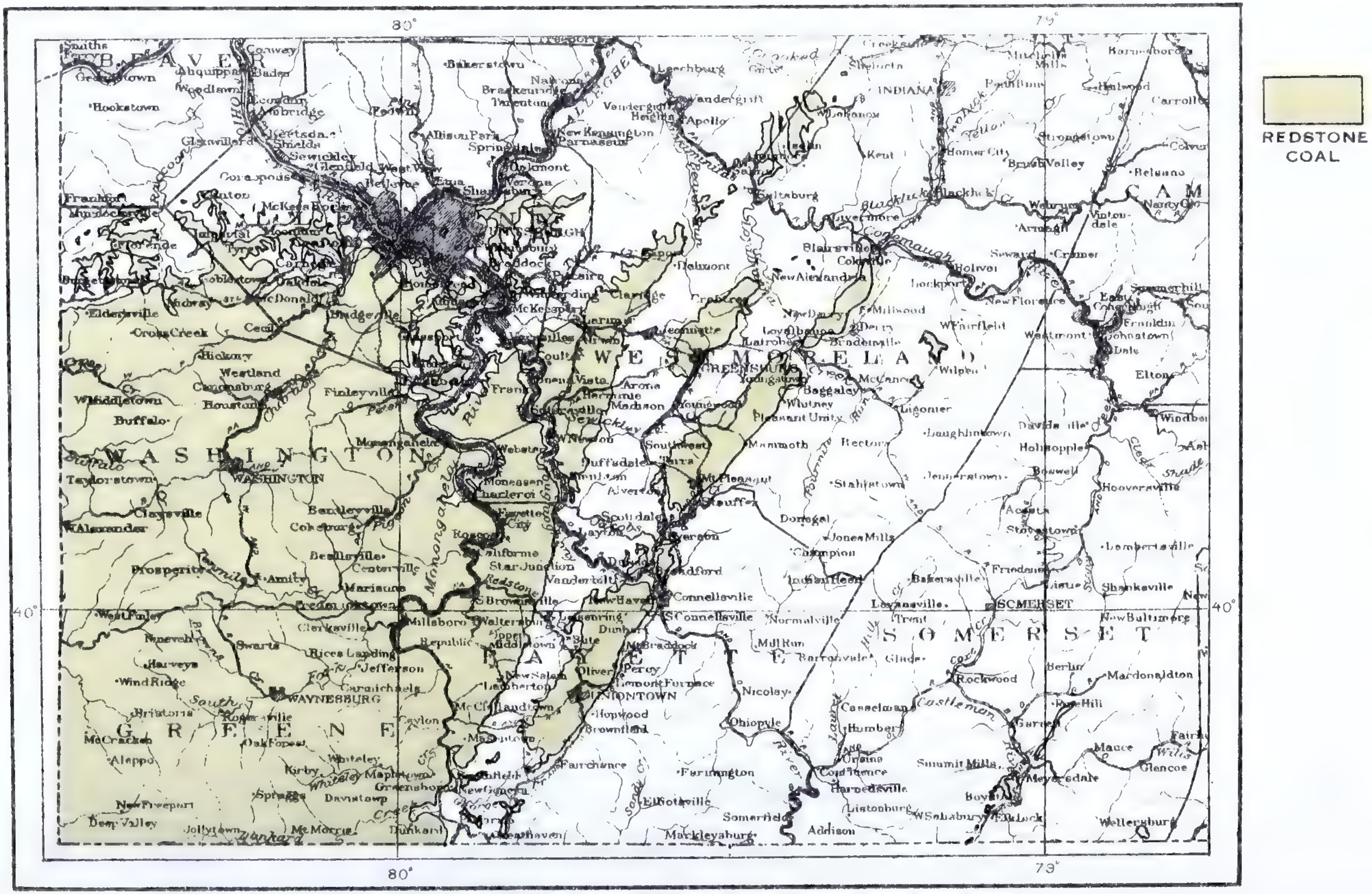
BULLETIN M-6 PT. II PLATE V



MAP SHOWING AREA UNDERLAIN BY REDSTONE COAL

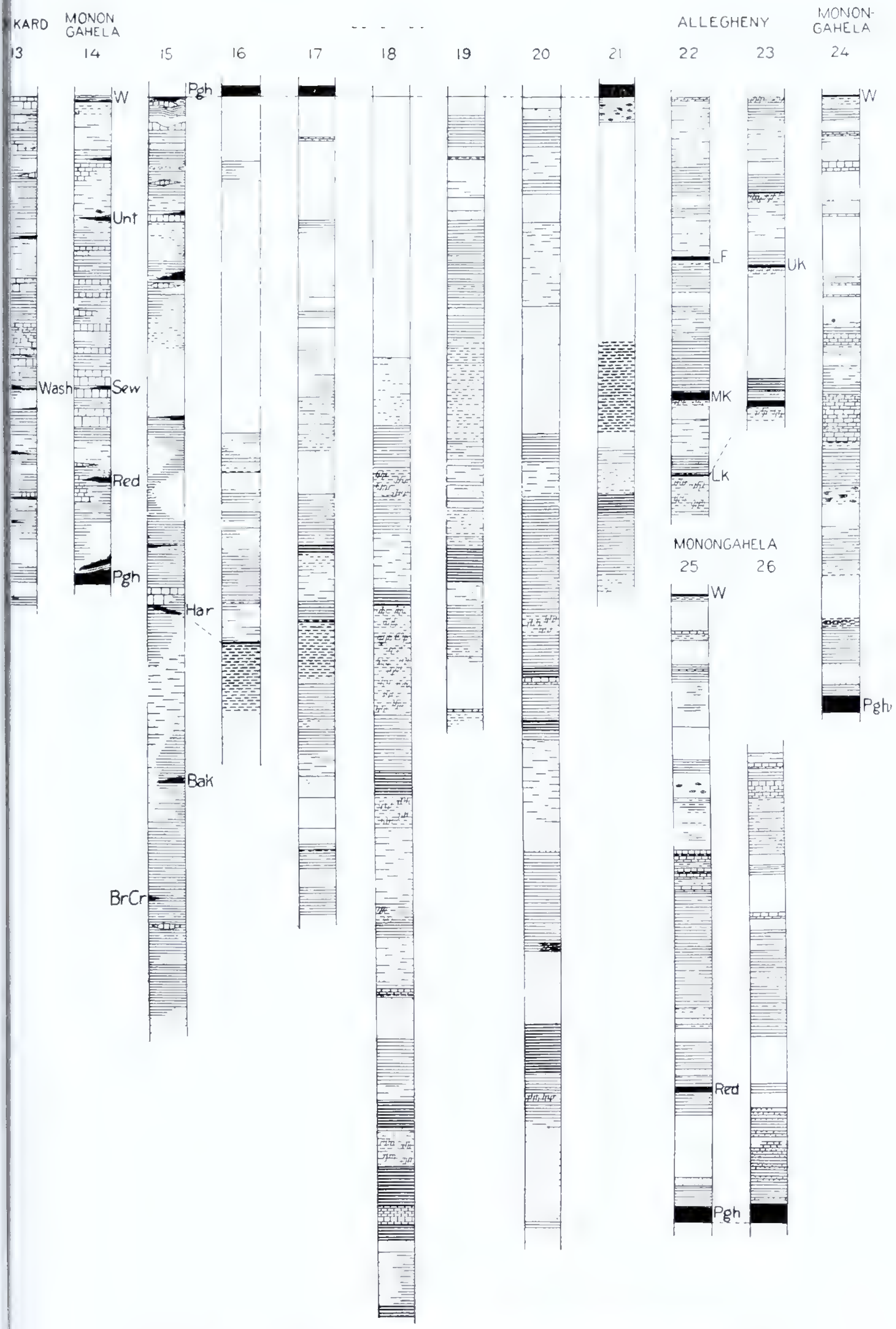


Figure 2. Stratigraphic sections, Allegheny County.

1. Northeast of Unionville, U. S. G. S. Sewickley folio.
2. South of Unionville, U. S. G. S. Sewickley folio.
3. Rehoboth Church to Crows Run, U. S. G. S. Sewickley folio.
4. Southeast of mouth of Crows Run, U. S. G. S. Sewickley folio.
5. East of Baden, U. S. G. S. Sewickley folio.
6. Crows Run and Legionville Hollow, U. S. G. S. Sewickley folio.
7. West of West Economy, U. S. G. S. Sewickley folio.
8. Leetsdale and south of Shousetown, U. S. G. S. Sewickley folio.
9. Vicinity of Carnot, U. S. G. S. Sewickley folio.
10. Northeast of Bear Run, U. S. G. S. Sewickley folio.
11. Near Mars, U. S. G. S. Sewickley folio.
12. East of Myoma, U. S. G. S. Sewickley folio.
13. Generalized section of Dunkard group, U. S. G. S. Burgettstown-Carnegie folio.
14. Generalized section of Monongahela group, U. S. G. S. Burgettstown-Carnegie folio.
15. Generalized section of Conemaugh group, U. S. G. S. Burgettstown-Carnegie folio.
16. Conemaugh group, ¾ mile west-north-west of Millvale, north of Pittsburgh.
17. Conemaugh group, from Nadine, Penn township, to end of Lincoln car line.
18. Conemaugh group in diamond drill hole, Joseph Stotler farm, 1 mile west of Clarksville, Penn township.
19. Conemaugh group in section ½ mile south of Belle Bridge, Lincoln township.
20. Conemaugh group in drill hole 1 mile south of Lock No. 3, Forward township.
21. Conemaugh group just south of the Pennsylvania Railroad between East Pittsburgh and Wilmerding.
22. Allegheny group in diamond drill hole at Greenock, Elizabeth township.
23. Allegheny group in diamond drill hole ½ mile south of Terrace, Mifflin township.
24. Monongahela group between Willock, Baldwin township and B. M. 1224 (1124 on topographic map).
25. Monongahela group from Frank, Elizabeth township, westward to B. M. 1117 on topographic map.
26. Monongahela group 1 to 2 miles south of sharp bend in Pennsylvania Railroad at Turtle Creek.

COALS.

The following table shows the stratigraphic relation of the coal beds and their range in thickness.

Coal beds in Allegheny County.

Group	Name of bed	Average interval	Usual range in thickness of coal beds			
			Ft.	in.	Ft.	in.
Monongahela 330	Waynesburg		0	0	3	0
		90				
	Uniontown		0	0	1	0
		130				
	Sewickley		0	0	3	6
		40				
	Redstone		0	6	5	0
		70				
	Pittsburgh (Lower Div.)		3	6	9	0
		100				
Conemaugh 625	Little Clarksburg		0	0	1	0
		85				
	Wellersburg		0	0	0	6
		80				
	Duquesne		0	0	1	6
		28				
	Harlem		0	0	2	9
		90				
	Bakerstown		0	0	2	8
		130				
	Brush Creek (Gallitzin)		0	0	2	6
		60				
	Mahoning		0	0	2	0
		52				
Allegheny 290	Upper Freeport		2	0	10	0
		45				
	Lower Freeport		0	0	1	6
		50				
	Upper Kittanning		0	0	2	0
		40				
	Middle Kittanning		0	0	4	0
		35				
	Lower Kittanning		0	0	3	6
		80				
	Clarion		0	0	2	0
		35				
	Brookville		0	0	2	0

The greatest coal reserves in Allegheny County are in the Allegheny group, which contains the Kittanning and Freeport coal beds. This group outcrops on Allegheny River north of Pittsburgh and on Pine Creek in the north-central part of the county, but lies deep under the remainder of the county. The quality and thickness of its coals are known by private concerns that have tested their properties with core drills. Unfortunately this Survey does not have much information concerning these records and the discussion of these coals will necessarily be limited. It is hoped that eventually information will be available so that this Survey can make a more comprehensive statement concerning these coals. It is only by co-operation between private concerns and the State bureaus that general knowledge of our mineral resources can be advanced.

Brookville and Clarion Coals.

The Brookville and Clarion coals are known only from drill records. They are thin beds, averaging less than 12 inches each, and having a local maximum thickness of 2 feet. They are lacking in large parts of the county, or their horizons are marked by several feet of bituminous shale.

Kittanning Coals.

The Kittanning coal beds, lying under deep cover in practically all of the county, are known only from drill records. They are thin wherever they have been identified. The Lower Kittanning is the most promising bed, but averages only about 12 inches thick where found. Locally it is 3 feet 6 inches thick and may be workable. The Middle and Upper Kittanning coals are thin and insignificant.

Upper Freeport (E) Coal.

The question as to whether a thick coal at the top of the Allegheny group in the northeastern part of Allegheny County is the Upper Freeport, or a combination of the Upper and Lower Freeport, has long been discussed by coal men. It is hoped that the detailed geological work to be done by this Survey in that region will solve the problem. For convenience, the Thick Freeport coal will be discussed under the heading of Upper Freeport.

The Upper Freeport coal outcrops in the northeast corner of the county on Allegheny River, and in the north-central part of the county on Pine Creek. The coal ranges from 2 to 10 feet thick. Where thickest there is commonly 2 feet of cannel coal at the top. A shale and bone parting ranging from 1½ inches to 2 feet thick is

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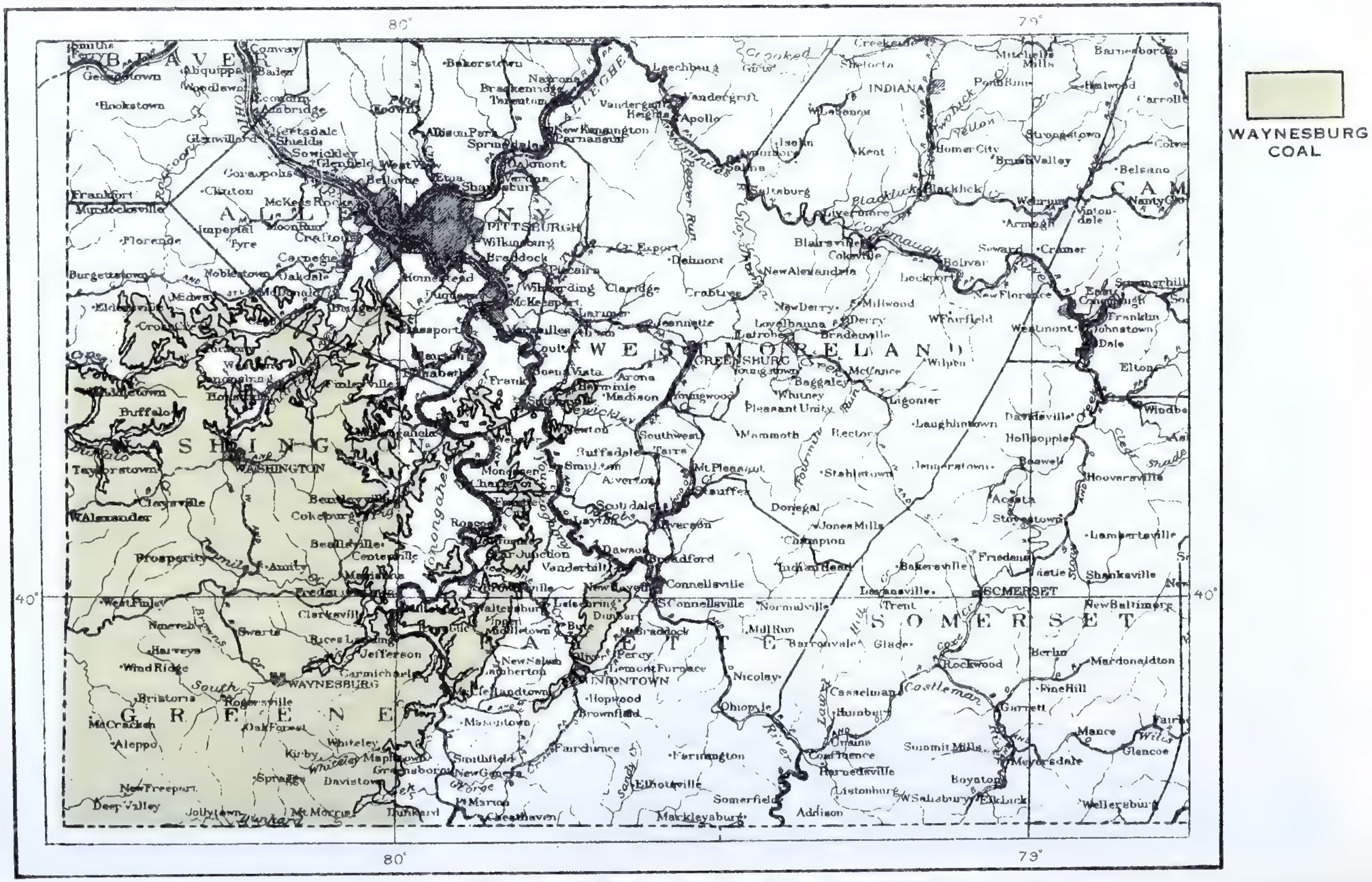

MAP SHOWING AREA UNDERLAIN BY WAYNESBURG COAL

PLATE IX

Upper Freeport coal in Thick Freeport area, Allegheny County.

Locally in the vicinity of Culmerville, West Deer township, the cannel coal is separated from the main bed by approximately 4 feet of shale.

The Thick Freeport is a friable coal, composed of alternating bright lustrous and dull resinous bands. The lower part of the bed is blocky, the middle part is the stick variety, and locally the top of the bed is canneloid coal. The coal breaks out in fair-sized lumps. It averages about 33 per cent volatile matter, 56 per cent fixed carbon, 8 per cent ash, and 1.5 per cent sulphur.

The following sections illustrate the occurrence of the Upper Freeport coal in Allegheny County:

usually present in the bed about 2 feet from the top. When this parting exceeds 14 inches, the upper bench is not mined, and the parting is left as roof. Two binders of bony coal are invariably present, one about 5 inches, and the other about 12 inches from the bottom. Often the upper binder is used as a floor, and the two thin benches of coal underlying it are not mined.

The area of Thick Freeport coal in Allegheny County is confined to the eastern half of Richland township, the northern half of Hampton township, all of West Deer township except the northeast corner; most of Indiana township, the eastern half of O'Hara township, all of Harmar and Springdale townships, and the greater part of Frazer township; all of Plum township and the northeast part of Penn township. The dividing line between the Thick and Thin Freeport coal in Frazer township runs N. 35° W. from Tarentum.

The bed is mined extensively at the following points in the area: Creighton, Frazer township, drift; Glassmere, Frazer township, slope, 50 feet; Russellton, West Deer township, shaft, 226 feet; north of Russellton, shaft, 210 feet; 1½ miles south of Culmerville, shaft, 110 feet; 1 mile west of Culmerville, shaft, 110 feet; Bairdstown, shaft, 210 feet; Indianola, Indiana township, shaft, 197 feet; Harwick, Springdale township, shaft, 220 feet. On the east side of Allegheny River in Allegheny County the Thick Freeport is mined at Renton, Plum township, shaft, 520 feet; Unity, Penn township, shaft, 298 feet; Barking, Plum township, shaft, 120 feet; Logan's Ferry, shaft, 168 feet.

Some of the more detailed measurements of the Upper Freeport are as follows: At Butler Junction and Karns station the Upper Freeport averages 3 feet 2 inches thick, including a persistent shale parting ½ inch to 2 inches thick, 2 to 5 inches above the bottom. The top bench ranges from 2 feet 6 inches to 3 feet 2 inches thick. Half a mile northeast of Natrona the coal occurs in a single bench 3 feet 4 inches thick. At Natrona the characteristic parting near the bottom of the bed again occurs and is persistent from that point south in East Deer township. Throughout this entire area the upper bench ranges from 2 feet 11 inches to 3 feet 1 inch thick; the bottom bench from 3 to 5 inches thick.

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At Creighton the coal thickens suddenly and is locally known as the Thick Freeport. In East Deer, Springdale, Plum, Harmar, Indiana, and West Deer townships the persistence in physical character of this bed is remarkable. A characteristic bone parting, 6 to 11 inches thick, is present 2 feet 1 inch to 4 feet below the top. The bottom bench is locally clean, but usually there are one or two thin bone binders near the bottom. The coal in most mines is overlain by several inches of cannel coal which is used as a roof. This cannel coal is not persistent in Indiana and West Deer townships.

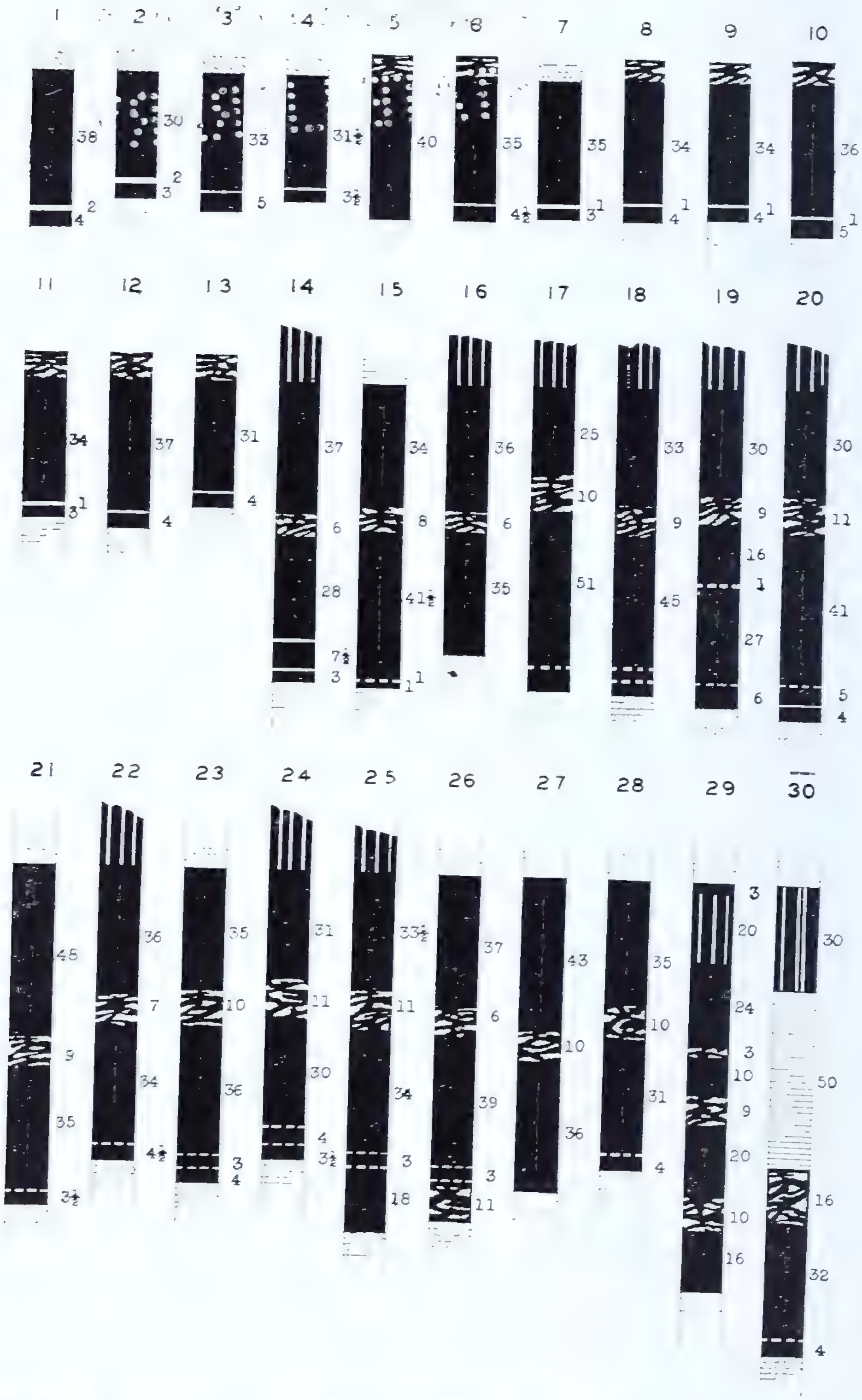


Figure 3. Sections of Upper Freeport coal in Allegheny County.

1. Butler Junction Coal Company. Butler Junction mine, at Butler Junction, Harrison township.
2. Dalliba Coal Company. Dalliba No. 2 mine, ¼ mile southeast of Butler Junction, Harrison township.
3. Ruth Coal Company. Ruth No. 3 mine, ¾ mile north of Karns Station, Harrison township.
4. Ruth Coal Company. Ruth No. 1 mine, at Karns Station, Harrison township.
5. Pennsylvania Salt Manufacturing Company. No. 2 mine, ½ mile northeast of Natrona, Harrison township.
6. Pennsylvania Salt Manufacturing Company. Natrona No. 1 mine, at Natrona, Harrison township.
7. Allegheny Coal & Coke Company. Avenue No. 1 mine, at Brackenridge Station, Harrison township.
8. Van Thiel Coal Company. Van Thiel mine, on east bank of McDowell Run, ⅕ mile northeast of Bull Creek, Fawn township.
9. J. C. Porter Coal Company. Porter mine, on Bull Creek at confluence with McDowell Run, Fawn township.
10. Haas Coal Company. Haas mine, ⅕ mile east of McDowell Run, on north side of Bull Creek Road, Fawn township.
11. Fawn Coal Company. Camp No. 2 mine, on west bank of Bull Creek, 2 miles northwest of Tarentum, Fawn township.
12. Allegheny Coal & Coke Company. Avenue No. 2 mine, on west bank of Bull Creek, 1¼ miles northwest of Tarentum, Fawn township.
13. West Tarentum Fuel Company. Peterson mine, at Peters Station, East Deer township.
14. Pittsburgh Plate Glass Company. Creighton Coal Works, at Creighton, East Deer township.
15. McFetridge Bros. Hite mine, at Hite, East Deer township.
16. Crucible Fuel Company. Cornell mine, ¼ mile north of Glassmere, East Deer township.
17. Allegheny Pittsburgh Coal Company. Springdale Shaft, at Springdale, Springdale township.
18. Hillman Coal & Coke Company. Oakmont No. 1 mine, east bank of Allegheny River near Barking Station, Plum township.
19. Union Collieries Company. Renton No. 3 mine, on Plum Creek, 1¼ miles northeast of New Texas, Plum township.
20. Newfield By-Products Coal Company. Newfield No. 1 mine, ½ mile southeast of Milltown, Penn township.
21. Consumers Mining Company. Harmar mine, at Harmarville, Harmar township.
22. Harwick Coal & Coke Company. Harwick mine, at Harwick, Springdale township.
23. Inland Collieries Company. Indianola No. 1 mine, on Deer Creek, 3 miles northwest of Harmarville, Indiana township.
24. Harrison and Quinnette. Thomas mine, 1 mile northeast of Dorseyville, Indiana township.
25. Monarch Fuel Company. Rural Ridge mine, at Rural Ridge Station, Indiana township.
26. Republic Iron & Steel Company. Bessemer No. 2 mine, 2½ miles south of Russelton Station, Indiana township.
27. Superior Fuel Company. Superior No. 1 mine, ¾ mile northeast of Russellton, West Deer township.
28. Ford Collieries Company. Berry mine, ¼ mile west of Bairdford Station, West Deer township.
29. Ford Collieries Company. Francis mine, near Culmersville, West Deer township.
30. Mutual By-Products Coal Company. Mutual No. 3 mine, 1 mile north of Culmersville, West Deer township.

CONEMAUGH COALS.

The Conemaugh group contains seven or more coal beds of irregular occurrence called in ascending order, Mahoning, Brush Creek (Gallitzin), Bakerstown, Harlem, Duquesne, Wellersburg, and Little Clarksburg.

MAHONING COAL.

The Mahoning bed averages about 8 inches, and has a local maximum thickness of 2 feet. It has never been mined.

BRUSH CREEK COAL.

This bed is persistent, but thin in Allegheny County. It averages about 12 inches thick where present, and has a maximum thickness of 2 feet 6 inches. It has been mined in the northern part of the county for house coal.

BAKERSTOWN COAL.

The Bakerstown coal received its name from Bakerstown, Richland township, where the coal is 2 feet 8 inches thick, including two thin shale partings. It has been mined for house coal in this vicinity. The bed is very lenticular, but probably averages 18 inches thick in the northern part of the county; in the southern part of the county it is very thin or entirely lacking.

HARLEM COAL.

The Harlem coal is unimportant in the county, having a maximum thickness of 2 feet 9 inches, and an average thickness of 1 foot 8 inches. It has not been mined.

DUQUESNE COAL.

This bed is generally thin, but very persistent in Allegheny County. It probably is thickest at Murdockville, where it is over 3 feet. It is an excellent blacksmithing coal and has been mined. The bed has been opened east of Perrysville, where the coal is reported to be 6 feet thick, 3 feet 4 inches of which is good clean coal. It has also been opened at many places in Franklin and Marshall townships, where it ranges from 1 to 5 feet thick.

LITTLE CLARKSBURG COAL.

This thin but persistent bed averages less than 12 inches but has a maximum thickness of 2 feet 6 inches in the extreme southwest corner of the county. It is 2 feet thick at Bayne.

PITTSBURGH COAL.

The Pittsburgh coal is the most important bed in Allegheny County, its type locality. Generally the bed is double, consisting of a roof division and a lower division, separated by a clay parting 1 inch to 3 feet thick and containing thin bands of coal. The roof division ranges from 2 inches to 8 feet thick, increasing in thickness northward. Occasionally it is a single bench, but commonly it contains two or more benches of coal, separated by clay. The coal of the upper division invariably is poor, because of the large percentage of ash.

The lower division of the Pittsburgh bed is 3 feet 6 inches to 9 feet thick, and has three persistent shale and bone partings, which divide it into four distinct benches, the upper or breast, the bearing-in, the brick, and the lower bottom coal.

The upper bench averages about 4 feet of good clean stick coal. Locally it has a thin bone parting.

The bearing-in bench, 2 to 4 inches thick, is separated from the other benches by thin bone partings. The coal is soft, and falls to slack when mined.

The brick bench, ranging from a few inches to 3 feet thick, is characterized by cleavage planes which break the coal into brick-shaped blocks. The coal is excellent.

The lower bottom bench is thin and dirty. Locally it is worthless, and is left in the mine for bottom.

The Pittsburgh coal contains 57 to 65 per cent fixed carbon, 30 to 35 per cent volatile matter, 4 to 14 per cent ash, and the sulphur is usually under 1 per cent.

Only about 250 acres of Pittsburgh coal remain in Allegheny County between Ohio and Allegheny rivers. In that district the roof division has a maximum thickness of 6 feet, including partings; the main clay averages 8 inches; the lower division averages 5 feet, and is separated into three benches by very thin partings.

An enormous quantity of excellent steam and gas coal has been taken from the Pittsburgh bed between Youghiogheny and Allegheny rivers. In that district the roof division ranges from a few inches to 4 feet thick; the main clay is 12 inches thick. The lower division has an average thickness of 5 feet 6 inches, and is divided into three benches.

Between Monongahela and Youghiogheny rivers the roof division averages about 3 feet and is much parted. The main clay is 11 inches thick; the lower division averages 6 feet, and is divided into three benches.

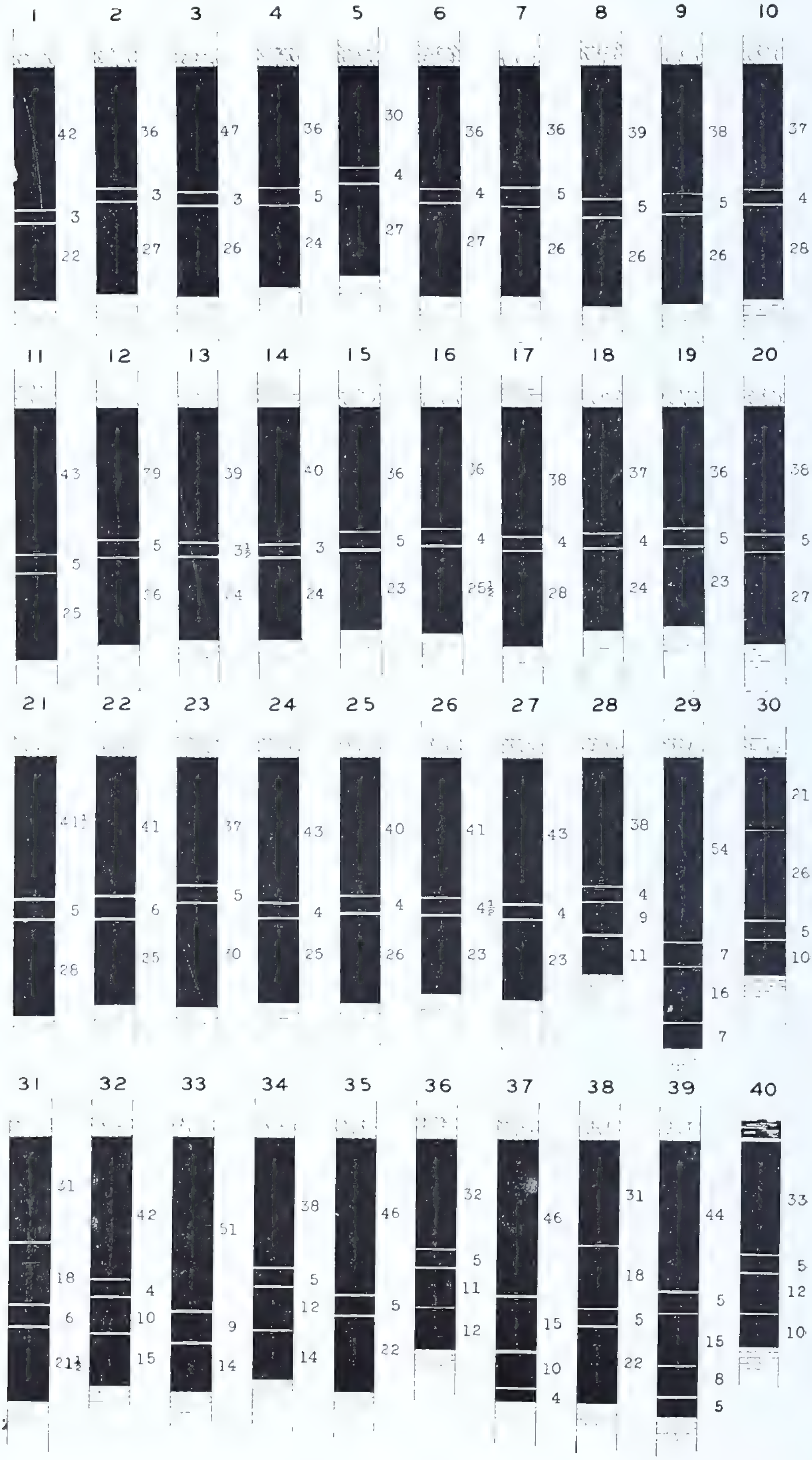


Figure 4. Sections of Pittsburgh coal in Allegheny County.

1. Hillman Coal & Coke Company. Ella mine, ½ mile northeast of Milesville, Forward township.
2. Pittsburgh Coal Company. Sunnyside mine, at Milesville, Forward township.
3. Pittsburgh Coal Company. Gallatin mine, at Gallatin, Forward township.
4. Pittsburgh Coal Company. Manown mine, at Manown, Forward township.
5. Pittsburgh Coal Company. Mongah mine, at Brownsdale, Forward township.
6. Curry Coal Company. Wright mine, at Parke, Forward township.
7. Hillman Coal & Coke Company. Patterson No. 2 mine, ⅓ mile southeast of Wylie station, Elizabeth township.
8. Robert Griffiths. Griffiths mine, at the junction of Boston and Lovedale roads, Elizabeth township.
9. Boston Yough Coal Company. May mine, ¾ mile south of Boston, Elizabeth township.
10. Pittsburgh Coal Company. Yough No. 2 mine, at Boston, Elizabeth township.
11. Boston Coal Company. Decker mine, on west bank of Monongahela river, 1 mile south of Greenock, Elizabeth township.
12. Pittsburgh Coal Company. Ocean No. 2 mine, on west bank of Monongahela river, ¼ mile south of Scott Haven, Elizabeth township.
13. Pittsburgh Coal Company. Forest Hill mine, on west bank of Monongahela between Douglass and Smithdale, Elizabeth township.
14. Howard C. Pierce. Pierce No. 2 mine, on Lovedale Hollow road near Portvue Junction, Lincoln township.
15. W. E. Carothers Coal Company. Belle Bridge mine, at Belle Bridge, Lincoln township.
16. O. M. & S. Coal Company. Green mine, 1 mile southeast of Glassport in Cousin's Hollow, Lincoln township.
17. Bowman Bros. Coal Company. Edmundson mine, at Portvue, Portvue Borough.
18. R. B. Blackburn. Blackburn mine, at Glassport, Glassport Boro.
19. Mon-Yough Coal Company. McClure No. 3 mine, in Liberty Boro.
20. M. P. Clark. Coulter mine, at Alpsville, Versailles township.
21. H. J. Myers. Myers mine, in Stewarts Hollow in eastern Versailles township.
22. Union Valley Coal Company. Union Valley No. 2 mine, at the junction of the Coulter and State roads in eastern Versailles township.
23. Bowman Bros. Company. Hiland mine, at Tin Plate Mill opposite Duquesne, North Versailles township.
24. John Semenko. Semenko mine, on west side of Foster road near Crooked Run road, North Versailles township.
25. A. C. Overholt Coal Company. Carpenter mine, on Crooked Run road, 800 feet west of Lincoln Highway, North Versailles township.
26. T. H. & R. A. Taylor. Taylor mine, at East McKeesport, North Versailles township.
27. Thomas Harper Coal Company. Harper mine, on Lincoln Highway, 1 mile east of East McKeesport, North Versailles township.
28. South Wilmerding Coal Company. South Wilmerding mine, 1 mile east of South Wilmerding, North Versailles township.
29. Grimm Coal Company. Grimm mine, 1 mile north of Pitcairn, Patton township.
30. Harper Coal Company. Harper No. 1 mine, ½ mile west of Monroeville, Patton township.
31. Hall Coal Company. Sarver mine, on Ardmore Blvd., north of North Braddock.
32. Hyatt M. Cribbs. Delmas mine, 1 mile west of Trestle, Plum township.
33. Harper Coal Company. Plum Creek mine, on a north branch of Plum Creek, 1¼ miles northwest of Trestle, Plum township.
34. Union Collieries Company. Renton No. 5 mine, 2 miles west of Renton Station, Plum township.
35. Union Collieries Company. Renton No. 1 mine, at Renton, Plum township.
36. Union Collieries Company. Renton No. 4 mine, at Renton, Plum township.
37. Puckety Coal Company. Puckety mine, on Puckety Creek, 1 mile northwest of Drennen, Plum township.
38. Hall Coal Company. Hall mine, ¼ mile west of Hall station, Penn township.
39. Miller Bros. Miller mine, near Eagle School in southern Penn township.
40. York Estate. York mine, on Chalfont Creek near Hebron Church, Penn township.
41. H. S. Morrow. Morrow mine, ½ mile west of Rhodi, Penn township.
42. Berg & McConnell. Berg & McConnell mine, 2 miles west of Universal, Penn township.
43. Stoner & Wilson. Stoner & Wilson mine, near White Ash P. O., Penn township.
44. Hyatt M. Cribbs. Roadside mine, 2 miles southwest of North Bessemer, Penn township.
45. John H. Peterman. Peterman mine, 1 mile northeast of White Ash P. O., Penn township.
46. David Davis. West Elizabeth mine, at West Elizabeth, Jefferson township.
47. Mark C. Bickerton. Bickerton mine, ¾ mile southeast of Large, Jefferson township.

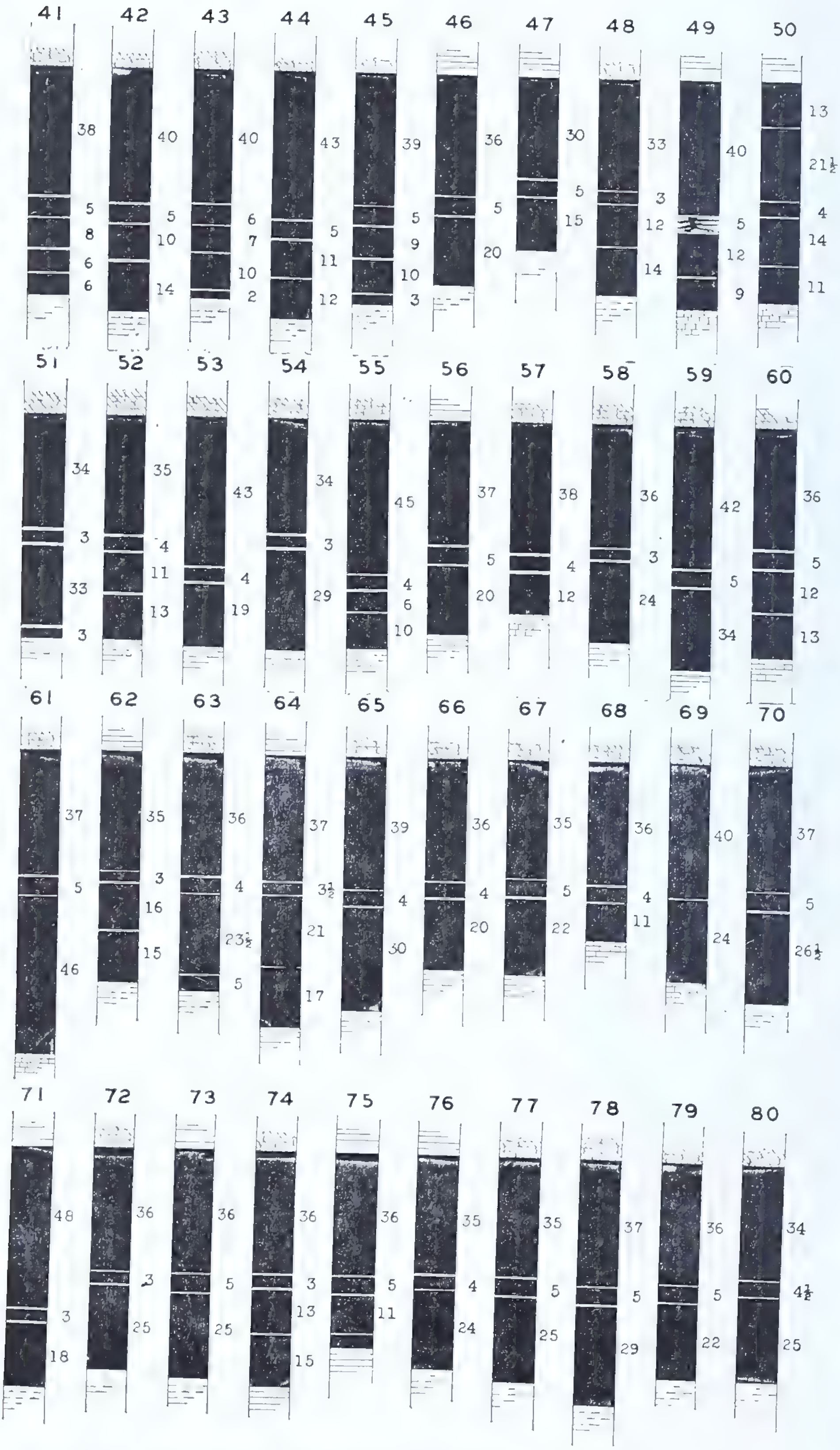


Figure 5. Sections of Pittsburgh coal in Allegheny County.

48. Pittsburgh Coal Company. Walton mine, 2 miles west-southwest of East Elizabeth, Jefferson township.
49. Pittsburgh Terminal Railroad and Coal Company. Mine No. 7, on Peters Creek, 2½ miles southwest of Mendelssohn, Jefferson township.
50. Gill Hall Coal Company. Viola mine, 2 miles south of Bruceton, Jefferson township.
51. Domestic Coal Company. Bertha mine, at Bruceton Station, Jefferson township.
52. Pittsburgh Coal Company. Montour No. 8 mine, 2 miles east-northeast of Bruceton, Jefferson township.
53. Walters Coal Company. Rock Run mine, near New England, Mifflin township.
54. Camden Coal Company. Camden mine, ¾ mile southwest of Dravosburg, Mifflin township.
55. Bull Run Coal Company. McClure mine, 1 mile northeast of Dravosburg, Mifflin township.
56. McClure Coal Company. Reed mine, ¾ mile southeast of Lincoln Place, Mifflin township.
57. Union Valley Coal Company. Union Valley No. 1 mine, on Union Railroad, 1½ miles west of Duquesne, Mifflin township.
58. Josep Wacha. Wacha mine, 1,000 feet south of end of Homeville Street car line, Mifflin township.
59. West Run Coal Company. Hays mine, on West Run road, ¼ mile south of West Homestead, Mifflin township.
60. Park Coal Company. Park mine, 1¾ miles southwest of Homestead, Mifflin township.
61. Homestead Coal Company. Risher No. 1 mine, between Wallace and Maust stop on Dravosburg electric line, Mifflin township.
62. Pittsburgh Terminal Railroad & Coal Company. Mine No. 6, at Bruceton, Snowden township.
63. Bruceton Fuel Company. Porter mine, ⅛ mile south of Bruceton, Snowden township.
64. Evans Gas Coal Company. Clyde mine, ¼ mile north of Snowden Station, Snowden township.
65. Pittsburgh Coal Company. Montour No. 10 mine, on Montour railroad, 1 mile southeast of Library, Snowden township.
66. Hill Top Coal Company. Hill Top mine, 1½ miles west of Hays Station, Baldwin township.
67. Brick Coal Company. Brick mine, on Glass Run Road west of Hays, Baldwin township.
68. Glass Run Coal Company. Glass Run, on Glass Run Road, 1 mile west of Hays, Baldwin township.
69. Becks Run Coal Company. Becks Run mine, on Becks Run Road, ¾ mile south of Carson Street, Baldwin township.
70. Pittsburgh Coal Company. Fair Haven mine, at 12th street, south side, Pittsburgh.
71. Fair Haven Coal Company. Englert mine, on Library road, in Overbrook Boro.
72. South Hills Coal Company. Saw Mill Run mine, ⅓ mile southwest of Fairhaven, Baldwin township.
73. Brown Bros. Brown mine, near Castle Shannon, Baldwin township.
74. Pittsburgh Terminal Railroad & Coal Company. Mine No. 4, on west side belt railroad near Broughton, Baldwin township.
75. Pittsburgh Terminal Railroad & Coal Company. Mine No. 8, near Coverdale, Bethel township.
76. Pittsburgh Terminal Railroad & Coal Company. Mine No. 3, one mile south of Castle Shannon, Bethel township.
77. Pittsburgh Coal Company. Harrison mine, on Painters Run, near Beadling, Upper St. Clair township.
78. Pittsburgh Coal Company. Bridgeville mine, at Bridgeville, Upper St. Clair township.
79. Pittsburgh Coal Company. Mansfield mine, at Carnegie, Scott township.
80. Boyle Coal Company. Quality mine, on Noblestown road, 1 mile south of Crafton, Green Tree Borough.
81. Brandy Coal Company. Brandy mine, at Bridgeville, Bridgeville Borough.
82. Pittsburgh Coal Company. Essen No. 3 mine, at Hazeltine, South Fayette township.
83. Gladdew Coal Company. Oakridge mine, ¼ mile southeast of Oakdale, South Fayette township.
84. Fayette Coal Corp. Chalfant mine, opposite Noblestown Station, south Fayette township.
85. McDonald Coal Company. Willow Grove mine, at Sturgeon, South Fayette township.
86. Harry Cattley. Cattley No. 2 mine, 1½ miles southwest of Woodville, Collier township.
87. Ollett Bros. Coal Company. Rosevale mine, 1 mile southwest of Woodvale, Collier township.

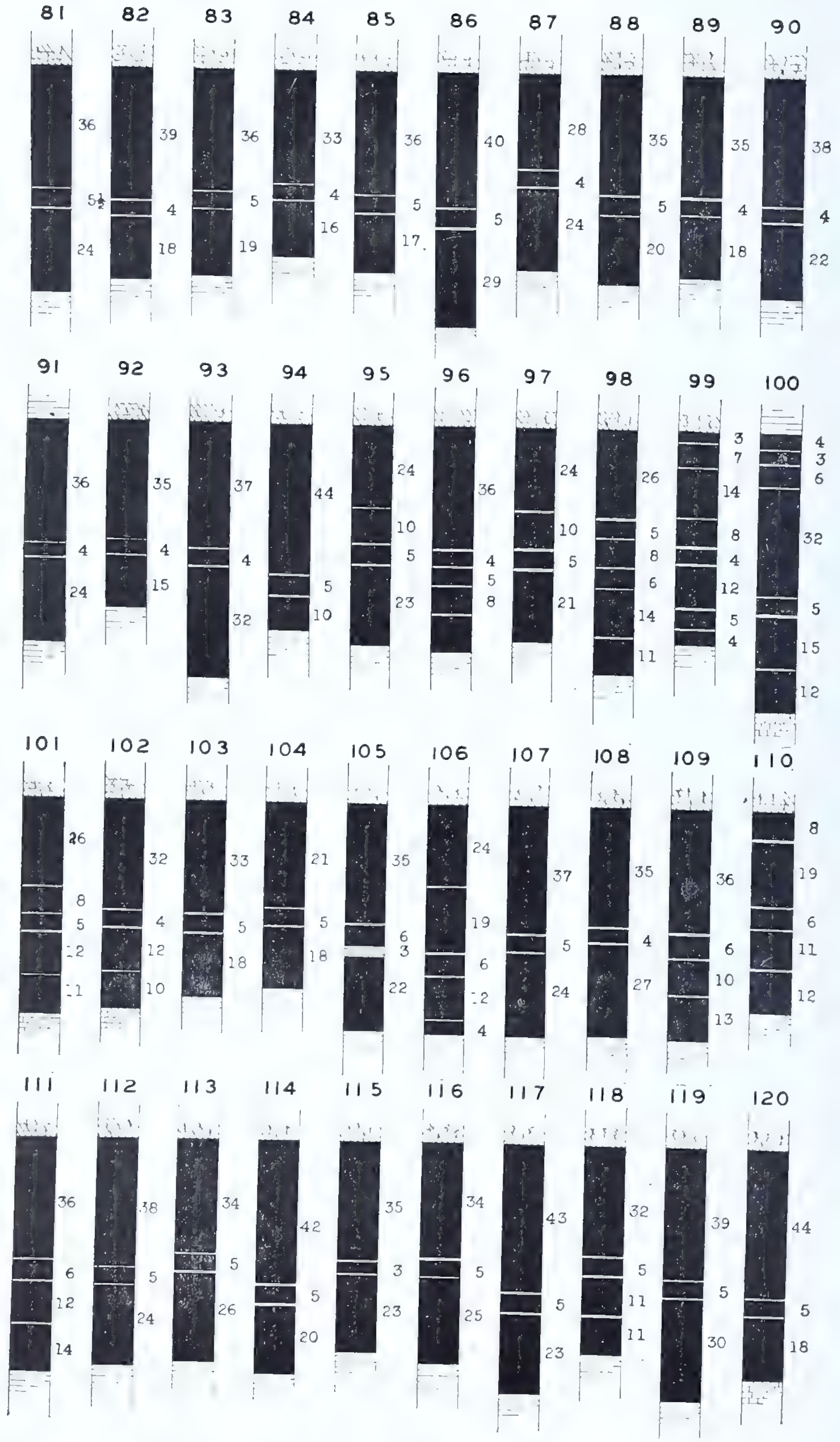


Figure 6. Sections of Pittsburgh coal in Allegheny County.

88. Allegheny County Home. Home mine, ¼ mile west of Woodville, near Hospital, Collier township.
89. Hugh McHugh. Cherry mine, ½ mile northwest of Rennerdale, Collier township.
90. Bess-Etta Coal Company. Bess-Etta mine, ½ mile northwest of Gregg Station, North Fayette township.
91. Pittsburgh Western Mining Company. English mine, ½ mile northwest of Gregg Station, North Fayette township.
92. Carnegie Coal Company. Oakdale mine, at Oakdale, North Fayette township.
93. Pittsburgh Coal Company. Champion mine, 1 mile northwest of Noblestown, North Fayette township.
94. Jean Coal Company. Jean No. 1 mine, 1 mile north of North Star, North Fayette township.
95. Margaret Coal Company. Margaret mine, at North Star, North Fayette township.
96. Pittsburgh Coal Company. Margerum mine, 1 mile east of Imperial, North Fayette township.
97. Pittsburgh Coal Company. Partridge mine, ¼ mile southeast of North Star Station, North Fayette township.
98. Jean Coal Company. Jean No. 2 mine, 1 mile northwest of Tyre P. O., Findley township.
99. Montour & Lake Erie Coal Company. Montour & Lake Erie No. 1 mine, at Boggs Station, Findley township.
100. Lebanon Block Coal Company. Lebanon Block mine, ¼ mile northeast of Clinton, Findley township.
101. Montour Run Coal Company. Oaklawn mine, on Montour Run, 2 miles northwest of Imperial, Findley township.
102. Eureka Coal Company. Eureka No. 1 mine, on Montour Run, 1 mile west of Imperial.
103. Montour Collieries Company. Scott mine, at Scott Station, Robinson township.
104. Wm. H. Ball Company. De Vasse mine, ¼ mile southwest of Gayley, Robinson township.
105. Pittsburgh Coal Company. Moon Run mine, at Moon Run, Robinson township.
106. Clever Gas Coal Company. Straub mine, on Moon Run, at Clever Station, Robinson township.
107. Englert Bros. Company. Roberts mine, at northwest edge of Carnegie Borough, Robinson township.
108. Henny Bros. Coal Company. Henny mine, 2 miles west of Crafton, Robinson township.
109. Ollett Bros. Rosevale No. 2 mine, ¼ mile south of Clever Station, east of Moon Run, Stowe township.
110. Creighton Coal Company. Creighton No. 1 mine, 1 mile northeast of Moon Run Station, Stowe township.
111. Fair Haven Coal Company. McKees Rocks mine, 1½ miles southwest of McKees Rocks, Stowe township.
112. Jos. Walton. Walton mine, ½ mile east of Crafton, Greentree Borough.
113. James F. Steel. Ward mine, at Bankville, West Liberty borough.
114. U. S. Coal & Supply Company. United States mine, on Wenzel Way, Dormont.
115. R. L. Thompson. Thompson mine, on North Pacific Avenue, East Liberty.
116. Elsie Coal Company. Elsie mine, on Lincoln Avenue, 1 mile east of Highland Park.
117. Cooper Coal Company. Cooper mine, on Campania Avenue, 1¾ miles northeast of East Liberty Station.
118. F. M. Lather. Hampton mine, on east borough line of Wilkinsburg.
119. United States Coal Company. Steinberg No. 1 mine, at Hazelwood.
120. Schenley Coal Company. Morgan mine, on Clendale Street, Clendale, Pittsburgh.

In the area south of Ohio River and west of Monongahela River the roof division is about 3 feet thick, where present, and has many clay partings. However, it has good quality locally, and is mined and shipped. It has also been opened separately in several localities. The main clay averages 2 feet thick. The lower division is always over 5 feet thick and is divided by thin partings of clay or shale into four or five benches. In the deepest part of the Panhandle trench between Beadling and Hickman, the Pittsburgh bed was over 10 feet thick but thinned rapidly to both sides.

The physical character of the Pittsburgh bed in Allegheny County is so remarkably uniform that it is needless to discuss local occurrences in this bulletin. The sections in Figures 4, 5 and 6 are representative of the district wherein they occur.

Redstone Coal.

The Redstone coal, lying 60 to 70 feet above the Pittsburgh coal, is thickest in the southeastern part of the county, and is mined at several localities in Elizabeth, Jefferson, Lincoln, and Portvue townships. The bed is extremely irregular, ranging from a few inches to 5 feet thick. The coal is clean, but rather high in ash and sulphur.

The Redstone coal ranges from 3 feet to 4 feet 2 inches thick in Forward township, and occurs in a single bench. The coal has very good quality. Possibly one of the greatest thicknesses of Redstone in Allegheny County is in the vicinity of Scott Haven, Elizabeth township. Here the bed averages 4 feet 4 inches thick, and is entirely clean. This thickness is not persistent, however. The bed appears to thin in the direction of Frank, Elizabeth township, and at that locality is only 2 feet 8 inches thick. In the vicinity of Elizabeth the bed again thickens and averages 4 feet 4 inches, and is entirely clean. At East Pittsburgh the bed is 3 feet 6 inches thick and is mined.

The Redstone is thin in Jefferson township, but two miles west of East Elizabeth it again is of minable thickness. In Snowden township the coal averages 2 feet 6 inches thick including a thin bone parting near the bottom.

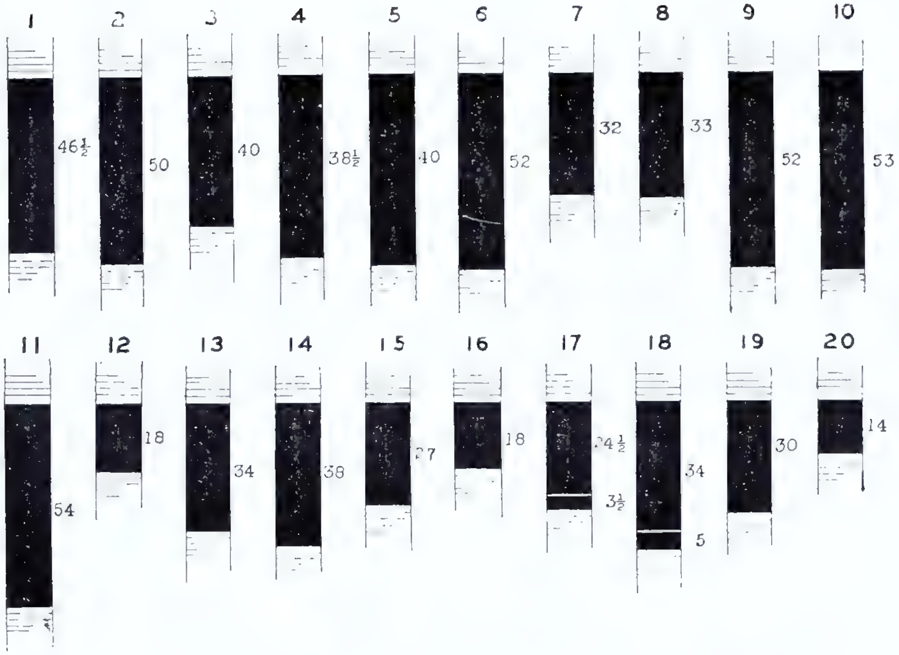


Figure 7. Sections of Redstone coal in Allegheny County.

1. S. A. & S. Coal Company. Berlin mine, on Pangburn Hollow road, 2 miles east of Elkhorn, Forward township.
2. C. & W. Coal Company. Clark & Williams mine, on Pangburn Hollow road, 1½ miles south of Lock No. 3, Forward township.
3. Howe Coal Company. Howe mine, on Monongahela River, ½ mile south of Lock No. 3, Forward township.
4. Lapsley Coal Company. Lapsley mine, on the right side of Roberts Hollow road, near intersection of Sutersville road, Forward township.
5. Riverview Coal Company. Riverview mine, at Douglass Station, Elizabeth township.
6. Scott Haven Coal Company. Spring Run, ¼ mile south of Scott Haven, Elizabeth township.
7. Outcrop at BM 888, 1 mile west of Frank, Elizabeth township.
8. Country bank, 100 yards south of BM 1032 near Buena Vista, Elizabeth township.
9. Country bank, Happy Hollow Fuel Company, 2 miles east of Elizabeth, Elizabeth township.
10. Batch Coal Company. Batch mine, on Roberts Hollow road, 1½ miles from Elizabeth, Elizabeth township.
11. John M. Williams. Hazel mine, on the Sutersville road, near intersection with Roberts Hollow Road, Elizabeth township.
12. Outcrop, 200 feet north of BM 889 in Lobbs Run Hollow, Jefferson township.
13. Outcrop, 2 miles west of East Elizabeth, Jefferson township.
14. Country bank, abandoned, ¼ mile north of East Elizabeth, Jefferson township.
15. Outcrop ½ mile west-southwest of BM 740, at Cochran's Mill, Jefferson township.
16. Outcrop 1 mile northeast of Bruceton, Jefferson township.
17. Outcrop 1½ miles west of Snowden, Snowden township.
18. Mine, abandoned, 1 mile west of Snowden, Snowden township.
19. Outcrop, Broughton, Snowden township.
20. Outcrop 300 yards east of Bruceton, Jefferson township.

SEWICKLEY COAL.

The Sewickley coal, lying about 120 feet above the Pittsburgh bed, averages less than 6 inches thick in the county, and is not mined.

OTHER COALS.

The Uniontown, Waynesburg, Waynesburg A and B coals, and the Little Washington coal are either too thin or too dirty to have commercial value. The Washington bed is locally 8 feet thick, but only 3 feet of coal at the bottom of the bed is clean enough to be mined. The acreage of this bed is so limited that the quantity of coal is very small.

CHAPTER II.

ARMSTRONG COUNTY.

INTRODUCTION.

Armstrong County ranks ninth in Pennsylvania as a producer of bituminous coal. After the high volatile coals of the Irwin basin in Westmoreland County have been exhausted, Armstrong County will become one of the foremost producers of bituminous coal in Pennsylvania. It contains larger reserves of easily accessible high volatile coal than any other county in the State. These coals are very high in sulphur, but when washed they make excellent gas coal. Large areas of good coal are unmined and even untested by outcrop prospects or core drill. The coals are regular in thickness, uniform in quality, and can be easily mined by drift or slope at almost every point.

There are about twenty coal beds in Armstrong County, two of which, the Upper Freeport and the Lower Kittanning, have great value in large areas. The Upper Kittanning, Lower Freeport, and Pittsburgh beds are minable in more restricted areas. Several other beds are locally minable; the remainder have no economic importance at present and only prospective future value.

Coal transportation is almost entirely by railroad. The Allegheny River Division of the Pennsylvania Railroad follows the east bank of Allegheny River across the county. A branch of this railroad leaves the main line at Redbank, follows Redbank Creek on its Clarion County side, and serves mines along the north boundary of Armstrong County. A short branch in the southwestern corner of the county serves the Big Buffalo Creek area. The Pittsburgh and Shawmut Railroad follows the west bank of the Allegheny as far north as Mahoning Creek; it crosses the river there, and follows Mahoning Creek into Jefferson County. The Baltimore and Ohio, and the Allegheny River railroads have a few miles of track in the northwestern tip of the county. The Buffalo, Rochester and Pittsburgh Railroad crosses the county from Craigsville to Dayton.

The highways are practically all dirt, the main traveled ones being kept in very good condition. In the unsettled parts of the county the roads are bad even in summer. The improved roads are confined almost entirely to the valley of Allegheny River, and are the only ones used for coal transportation.

The surface of Armstrong County is decidedly hilly. The valleys are narrow, with precipitous sides, and narrow flood plains. Large areas of flat or gently sloping land form the more elevated parts of the surface and are remnants of old peneplains. Allegheny River valley is for the most part narrow, with steep slopes, and very narrow flood plains.

STRUCTURE.

There are eleven major structural features in the county, each having a general northeast-southwest trend. They are as follows, in order from southeast to northwest: Elders Ridge syncline, Dutch Run anticline, Roaring Run anticline, Apollo syncline, Greendale anticline, Brookville anticline, Fairmount syncline, McHaddon syncline, Boggsville syncline, Kellersburg anticline, Bradys Bend syncline.

The western flank of the Elders Ridge syncline lies on the southeastern county boundary. This deep basin brings the Pittsburgh coal to outcrop on the Armstrong-Indiana county line. The rocks rise regularly and rapidly northwest.

Roaring Run anticline enters the county between Apollo and Avonmore, and extends northeast to Yatesboro, where it flattens out and disappears. It is a broad, flat anticline, with gentle slopes. The axis varies in elevation, and is double for about four miles where it crosses Crooked Creek near Girty.

Dutch Run anticline is a small fold with gently sloping flanks, lying just east of Dutch Run near the southeastern county line. It may be considered a spur of the Roaring Run anticline.

Apollo syncline lies northwest of Roaring Run anticline and extends through Cochran Mills to a point one mile south of Yatesboro. It is a narrow, shallow basin, with its axis pointing northeast to its lowest point on North Branch; from there it rises again until it merges with Roaring Run anticline south of Yatesboro.

Greendale anticline, lying northwest of Roaring Run anticline, extends between Crooked and Mahoning Creeks, and passes through Greendale. Its axis is irregular in elevation and direction. The rocks dip regularly on both flanks, the greatest dips being just north of Buffalo Creek.

The southern tip of Brookville anticline extends southwest to Mahoning Creek in the northeastern part of the county. Its axis plunges regularly to a point near Putneyville, where it merges with Fairmont syncline.

Fairmont syncline, lying northwest of Greendale anticline, is a broad basin, the axis of which dips to the southwest. The rocks rise rapidly on both flanks.

McHaddon anticline is a small fold running parallel to Allegheny River just west of Ford City and Kittanning. Its axis is nearly level, and the rocks dip gently on both flanks.

Boggsville syncline, lying northwest of McHaddon anticline, extends from Big Buffalo Creek to a point northwest of Kittanning near Allegheny River. It is a broad basin with the axis dipping southwest. The rocks rise rapidly northwest to the Kellersburg anticline.

Kellersburg anticline is the most pronounced fold in the county. It enters the county from the west near Winfield and extends northeast near Craigsville, Mahoning, and Kellersburg. The axis rises to a point midway between Browns Crossroads and Cowansville, where the rocks dip to the north, west, and south. The rocks begin to rise again at Allegheny River, and the deep channel of Redbank Creek exposes the Pocono sandstone.

Bradys Bend syncline enters the county two miles southwest of Somerville, and extends northwest to the Allegheny. It is a broad flat basin with extremely gentle dips on its flanks.

STRATIGRAPHY.

The outcropping rocks of Armstrong County belong to the Quaternary system, and to the Pennsylvanian and Mississippian series of the Carboniferous system. The Monongahela, Conemaugh, and Allegheny groups, and the Pottsville series are coal bearing.

The Quaternary system is composed of (1) recent deposits of alluvium in the valleys, (2) gravel and silt of glacial origin, (3) the Carmichaels formation composed of thin deposits of alluvium and stream-worn material on the terraces along Allegheny River.

The Monongahela group has been entirely eroded, except in the southeastern corner of the county, where the lower part is preserved in the hills along the county line. Two hundred and sixteen feet of strata remain above the Pittsburgh coal, chiefly limestones, sandy shales, sandstones, and thin coal beds.

The Conemaugh group is present in the southern two-thirds of the county except where streams have eroded it. The upper part of this group has been eroded over large areas. The total thickness of the group is about 650 feet, and it is composed largely of shales, a few limestones, and several massive sandstones.

The Allegheny group, composed of shales, massive sandstones thin limestones, and several workable coal beds, remains almost intact.

The Pottsville series is exposed on the Allegheny and its chief tributaries from Templeton to the northern county line. It is composed of two massive sandstones with shale between them. Its total thickness is approximately 140 feet.

The Mauch Chunk and Pocono series have a limited outcrop on Allegheny River, Mahoning and Redbank creeks. The Mauch Chunk series is composed of shale, and the Pocono of sandstone.

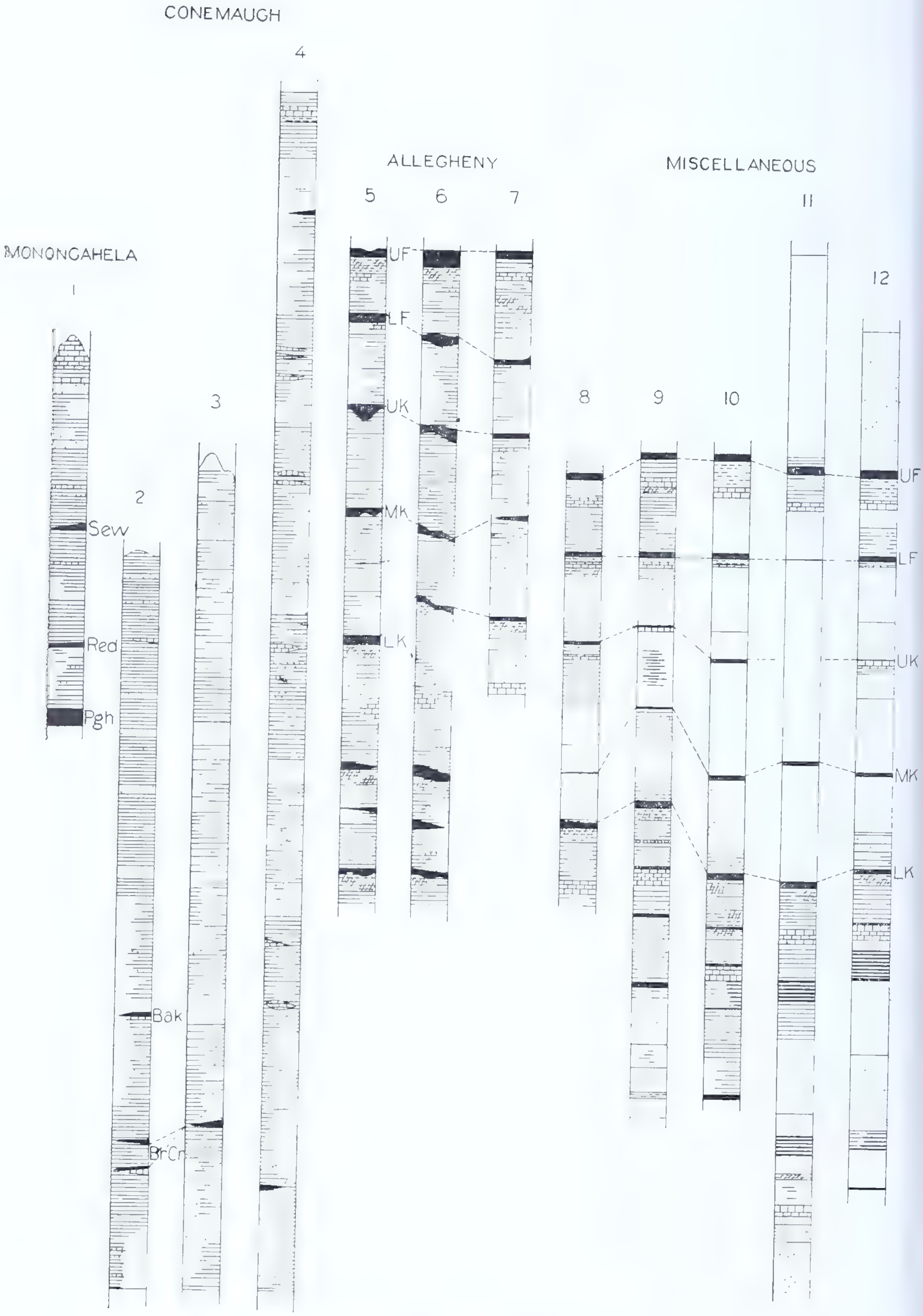


Figure 8. Stratigraphic sections, Armstrong County.

1. Generalized section, Monongahela group. U. S. G. S. Elders Ridge Folio.
2. Generalized section, Conemaugh group. U. S. G. S. Kittanning Folio.
3. Generalized section, Conemaugh group. U. S. G. S. Rural Valley Folio.
4. Generalized section, Conemaugh group. U. S. G. S. Elders Ridge Folio.
5. Generalized section, Allegheny group. U. S. G. S. Kittanning Folio.
6. Generalized section, Allegheny group. U. S. G. S. Rural Valley Folio.
7. Generalized section, Allegheny group. U. S. G. S. Elders Ridge Folio.
8. Section on Crooked Creek. Pennsylvania Second Geological Survey, vol. H5, page 57.
9. Section on Cowanshannock Creek. Pennsylvania Second Geological Survey, vol. H5, page 88.
10. Section on Pine Creek. Pennsylvania Second Geological Survey, vol. H5, page 105.
11. Section at McCrea. Pennsylvania Second Geological Survey, vol. H5, page 143.
12. Section at Putneyville. Pennsylvania Second Geological Survey, vol. H5, page 150.

COALS.

The following table shows the stratigraphic relation of the coal beds and their range in thickness.

Coal beds in Armstrong County

Group	Name of bed	Range in interval	Usual range in thickness of coal beds			
			Ft.	in.	Ft.	in.
Monongahela	Sewickley		1		5	
		80				
	Redstone			6	2	0
		40				
	Pittsburgh		6		10	0
		490				
Conemaugh	Bakerstown			6	4	0
		70				
	Brush Creek			0	2	6
		40				
	Mahoning			0	3	0
		50				
Allegheny	Upper Freeport (E)		2		7	2
		35-55				
	Lower Freeport (D)		2		6	0
		40-50				
	Upper Kittanning (C′)		1		15	0
		45-55				
	Middle Kittanning (C)		1		3	0
		40-70				
	Lower Kittanning (B)		1		5	0
		70-90				
	Clarion (A′)			0	4	8
		20-30				
	Craigsville			0	3	6
		20-35				
	Brookville (A)		2		6	0

The Upper Freeport is the most important commercial coal in Armstrong County; the Lower Kittanning is the next important coal. The Brookville, Middle Kittanning, Upper Kittanning, Lower Freeport, and Pittsburgh are also mined.

BROOKVILLE (A) COAL.

The Brookville bed lies approximately 29 feet above the Homewood sandstone and outcrops only along Allegheny River and its tributaries. It is geologically the lowest coal mined in Armstrong County. In general the bed is lenticular and extremely variable in quality; locally it is thick and the quality is good. The bed ranges from a few inches to 6 feet thick. It is never entirely clean with the exception of one locality at McWilliams, Redbank township. It is mined at many country banks for local use, and one shipping mine near Redbank is thought to be the Brookville. On Redbank Creek the bed is rarely seen. It is mined chiefly in the townships north of Mahoning Creek, where it ranges from 2 feet to 5 feet 8 inches thick. It is never entirely clean, being separated into two or more benches by bone coal partings.

In the vicinity of Rimerton station the coal has a total thickness of 5 feet 6 inches, including a 3-inch bone parting 6 inches below the top and 10 inches of bony coal at the bottom. At Mahoning, in Madison township, the coal is 4 feet 3 inches thick, 1 foot 8 inches of which is bony. At Kellersburg the bed occurs in three benches; the middle bench, which is bony, is 13 inches thick, the bottom bench 10 inches thick, and the top bench is 13 inches. At Mahoning Furnace the top bench is 17 inches thick, the bony bench 5 inches, and the bottom bench 5 inches. At Putneyville, Mahoning township, the bed thickens and is divided into benches by shale partings ranging from 8 to 12 inches thick. The top bench ranges from 15 to 18 inches thick, and the bottom bench from 17 inches to 2 feet 5 inches. On Pine Creek, near Charleston, the bed is 1 foot 8 inches thick, including 1½ inches of bone near the middle. At McWilliams the Brookville occurs in a single bench ranging from 2 feet to 2 feet 10 inches thick. Outcrops of the bed on Crooked, Pine, and Cowanshannock creeks indicate that it is inferior in quality. At Buffalo Mills the bed is 3 feet 2 inches thick but has several shale partings, and is valuable only as a source of local fuel. On Rough Run the Brookville is 2 feet 6 inches thick, including two 1-inch bone partings. It is reported to have a thickness of 3 feet 2 inches in West Franklin township. The bed is deep under cover in most of the southeastern part of the county, but drillings indicate that it is too variable in thickness and quality to make mining profitable while thicker and better quality coals, which outcrop in the same area, are yet unmined.

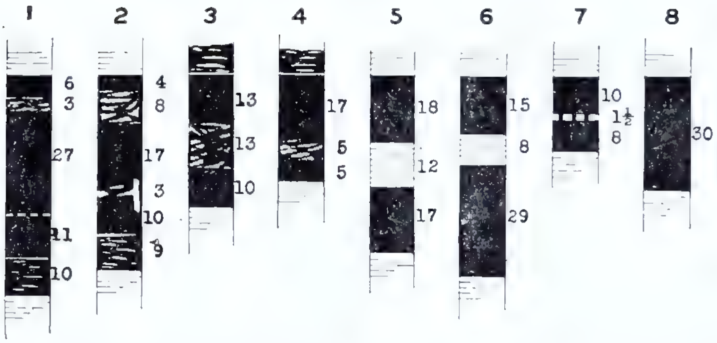


Figure 9. Sections of Brookville coal in Armstrong County.

1. Beacon Hill Coal Company. Riverside mine, ¾ mile southeast of Rimerton Station, Madison township.
2. Outcrop on Mahoning Creek at Mahoning, Madison township.
3. Outcrop 1 mile south of Kellersburg, Madison township.
4. Outcrop on Mahoning Creek, at Mahoning Furnace, Mahoning township.
5. Outcrop 1½ miles south of Putneyville, Mahoning township.
6. Outcrop on the big bend of Mahoning Creek, ½ mile south of Putneyville, Mahoning township.
7. Outcrop on Pine Creek near Charleston, Redbank township.
8. Outcrop on Pine Creek at McWilliams, Redbank township.

CRAIGSVILLE COAL.

The Craigsville coal, lying 20 to 35 feet above the Brookville, is a local occurrence and has a maximum thickness of 3 feet on Buffalo Creek, two miles northwest of Craigsville. It is reported to be 3 feet 6 inches thick half a mile northwest of Craigsville. It is a very good clean coal, but lenticular and subject to roof rolls.

CLARION (A) COAL.

The Clarion coal, lying about 75 feet above the Homewood sandstone, is thickest on the Allegheny north of Mahoning Creek. Here it ranges from 3 feet to 4 feet 8 inches thick, but is very pyritous and carries many bone and shale partings. At Parker City a 1-inch shale parting separates the bed into a 9-inch top bench and a lower bench 2 feet 8 inches thick. It is a hard compact coal, high in ash and sulphur. At the mouth of Mahoning Creek it ranges from 6 inches to 2 feet thick. At Buffalo Mills it is persistent and is 2 feet to 2 feet 6 inches thick. The Clarion coal is worthless in the vicinity of Kittanning. On Rough Run it is 2 feet 6 inches thick, including two 1-inch shale partings. It is minable at West Winfield and is 2 feet 6 inches thick at Fairmount. The coal is very thin or entirely lacking at all other localities.

Lower Kittanning (B) Coal.

The Lower Kittanning, lying 120 to 140 feet above the Brookville coal, is one of the chief sources of shipping coal in the county. It is the most important coal in the northern half of the county, especially west of a line drawn from Kellersburg to Kittanning. Within that area it is nearly everywhere over 2 feet 6 inches thick, averaging 3 feet 6 inches, and is locally 5 feet thick. Locally it has many bone partings and is high in sulphur. The bed probably is minable in the whole area.

The principal mining districts are along Allegheny River and Redbank Creek. It is mined to a small extent in the southeastern townships of Armstrong County. At Girty, on Crooked Creek in South Bend township, it is 2 feet 4 inches thick, not including two thin bone partings at various positions in the bed. This thickness is characteristic of the Lower Kittanning throughout the entire township. The Lower Kittanning has been measured at numerous outcrops and in drill hole records in other southeastern townships, but at few localities has it been considered thick enough to be mined at the present time. Eventually when this area is opened up by railroads the Lower Kittanning has commercial possibilities.

The bed is thick and good west of Allegheny River. It is mined at several localities in West Franklin township. At Craigsville it is a clean bed 4 feet thick. Where it is being mined near Worthington it is a clean bed 3 feet 6 inches thick. It is thinner at Nichola, averaging less than 2 feet. The top is bony coal. The Lower Kittanning is being mined for farm use in the vicinity of West Winfield, and in the southeastern corner of West Franklin township. The bed ranges from 2 feet 2 inches to 4 feet 4 inches thick, and is exceptionally free from noticeable impurities. Sulphur balls and bone lenses are sometimes present in the lower part of the bed. At Craigsville and Adrian the same characteristics prevail, but the coal is rather variable in thickness.

In the eastern part of East Franklin township the coal is very regular in thickness and quality, ranging from 2 feet 8 inches to 4 feet thick, averaging approximately 3 feet. The bed is free from partings or binders with the exception of a local area near Furnace Run where a 1-inch bone parting occurs 6 inches below the top. The Lower Kittanning thickens gradually northward.

Where mined in Washington township it averages 4 feet thick and ranges from 3 feet 8 inches to 4 feet 6 inches. The Lower Kittanning again thins northward, and in Bradys Bend township averages 3 feet 2 inches. As in Washington township, the bed is exceptionally free from visible impurities, although the coal is rather high in sulphur and ash due to the presence of thin lenses of pyrite and bone.

East of Allegheny River, in Madison township, the physical character of the Lower Kittanning changes entirely. The bed has a range of thickness of 3 feet 6 inches to 5 feet 3 inches. A bone parting ranging from 1 to 3 inches thick is most persistent 8 to 12 inches below the top. The bottom bench ranges from 2 to 4 feet thick. It is locally subdivided into two divisions by a 1-inch shale parting 8 to 12 inches above the bottom.

The Lower Kittanning is not being commercially mined in Mahoning township, probably because its thickness is so variable. It again appears as a prominent commercial bed in Redbank township. It has thinned perceptibly and occurs in varying numbers of benches. Locally it has a single bench, and within a few feet has two or three benches separated by thin bone and shale partings easily less than 1 inch thick.

At Eddyville the bed is 2 feet 8 inches thick, including three bone partings ½ to 1 inch thick. In the vicinity of Oak Ridge station the coal is 2 feet 8 inches thick, including a 1-inch bone parting 4 inches above the bottom. South of Oak Ridge station the parting disappears, to reappear in the vicinity of New Bethlehem. At Hawthorn the coal occurs in two benches, separated by a 1-inch bone parting. The top bench ranges from 6 to 10 inches thick, and the bottom bench averages 1 foot 9 inches thick. South of Hawthorn the parting disappears and the bed is 2 feet 3 inches thick. At Eddyville the coal occurs in three benches, separated by thin bone partings. The top bench is 6 inches thick, the middle 2 feet thick, and the bottom bench 3 inches thick. East of Eddyville, in the vicinity of McWilliams and Timblin, the coal averages 2 feet 9 inches thick, including a thin bone parting at varying positions in the bed.

The Lower Kittanning is not being mined commercially in Pine township, its thickness being irregular and quality variable. Locally it is over 4 feet thick, and without partings or binders. The Lower Kittanning averages slightly less than 3 feet thick in Boggs township, and rarely contains noticeable impurities in the form of binders and partings.

In Wayne township the quality of the Lower Kittanning is good, but it averages less than 2 feet 6 inches thick.

The Lower Kittanning again comes into prominence as a commercial bed in Reyburn township, where it ranges from 2 feet 6 inches to 4 feet thick. It contains a persistent 1-inch bone parting 5 to 10 inches below the top. The bottom bench ranges from 2 feet 2 inches to 3 feet thick. The bottom bench is locally subdivided into two or three divisions by thin bone partings.

In the vicinity of Kittanning the coal is 4 feet thick, including two 1-inch bone partings, one 8 inches above the bottom and another 10 inches below the top.

Practically the same physical character is present in Manor township where the Lower Kittanning is being mined commercially. The bed ranges from 2 feet 10 inches to 3 feet 4 inches thick, and is divided into two or more benches by thin bone partings.

The Lower Kittanning coal averages 37.5 per cent volatile matter, 50 per cent fixed carbon, 3.5 per cent sulphur, and 8 per cent ash. The coal is bright, and has columnar cleavage. It is soft, but mines out in fair sized lumps. The percentage of slack is rather large. With the exhaustion of the high-volatile coals of the Irwin basin, in Westmoreland and Fayette counties, the Lower Kittanning coal of Armstrong County will be used extensively for gas manufacture. It will be necessary to pick and wash the coal to attain the excellent quality of the coals now mined in the Irwin basin.

The following sections illustrate the occurrence of the Lower Kittanning coal in Armstrong County:

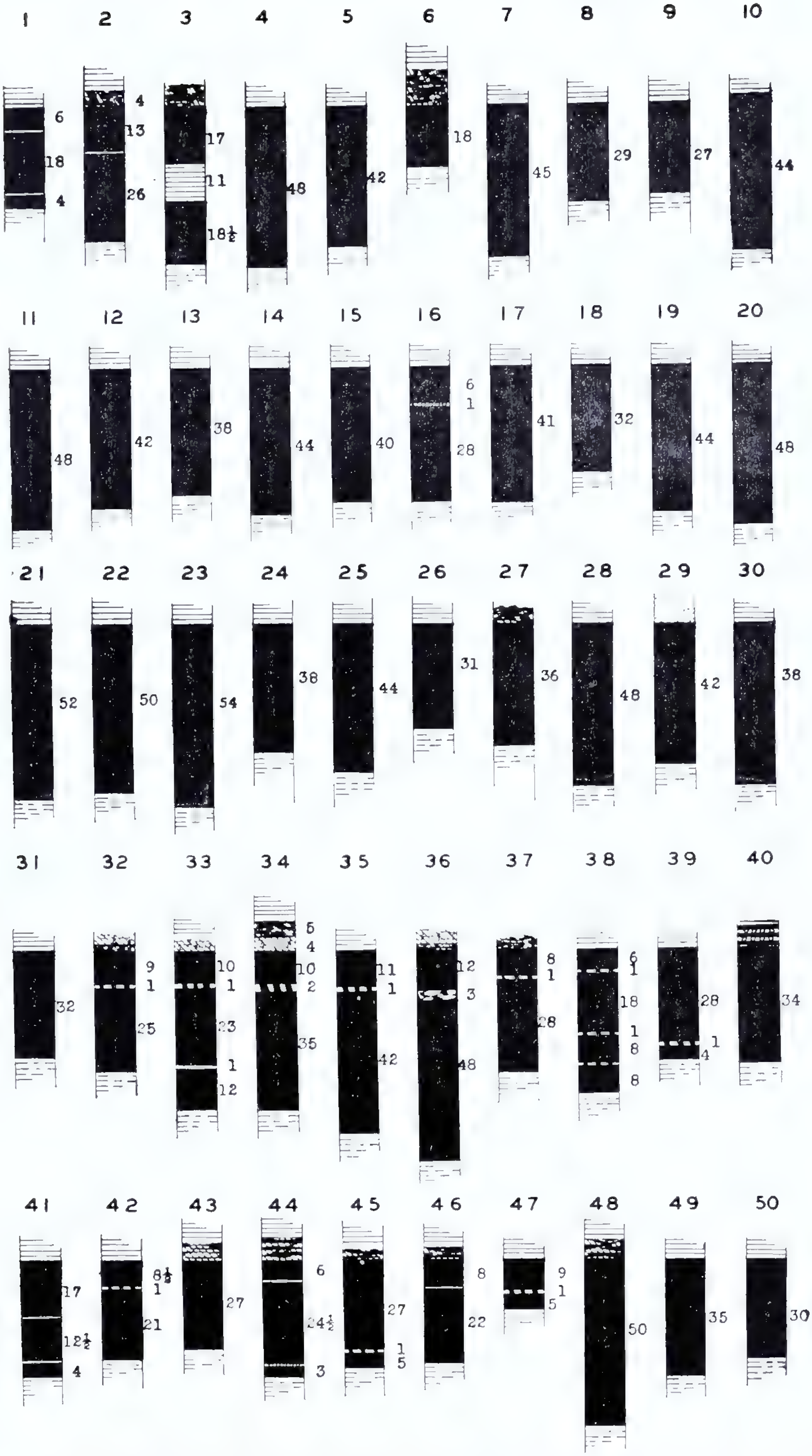


Figure 10. Sections of Lower Kittanning coal in Armstrong County.

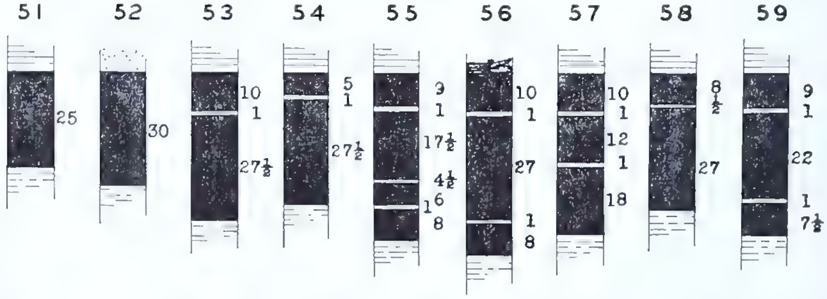


Figure 11. Sections of Lower Kittanning coal in Armstrong County.

1. Outcrop on Crooked Creek at Girty, South Bend township.
2. Allegheny River Mining Company. Cadogan No. 1 mine, at Cadogan, North Buffalo township.
3. Outcrop at mouth of Glade Run, North Buffalo township.
4. Crum Bros. Coal Company. Crescent mine, ½ mile southeast of Craigsville, West Franklin township.
5. Guaranty Coal Company. Graff mine, 1 mile west of Worthington, West Franklin township.
6. Consolidated Coal & Coke Company. Nichola mine, at Nichola, West Franklin township.
7. Outcrop, 1 mile northeast of West Winfield, West Franklin township.
8. Outcrop in southeastern corner of West Franklin township.
9. Outcrop 1½ miles northwest of Craigsville, West Franklin township.
10. Outcrop, at Adrian, East Franklin township.
11. Watson Bowser. Bowser mine, at Cowansville, East Franklin township.
12. James Coal Mining Company. Cowan No. 2 mine, ½ mile southwest of Cowan Station, East Franklin township.
13. West Kittanning Mining Company. West Kittanning mine, at Applewold, East Franklin township.
14. Henry Coal Company. Henry mine, opposite Kittanning, East Franklin township.
15. Mohawk Mining Company. Mohawk No. 2 mine, 2 miles north of Kittanning, East Franklin township.
16. Allegheny River Mining Company. Furnace Run mine, at Furnace Run, East Franklin township.
17. Lower Kittanning Mining Company. Lower Kittanning mine, 1 mile north of Furnace Run, East Franklin township.
18. Montgomery Coal Company. Montgomery mine, 1 mile east of Montgomeryville, East Franklin township.
19. Outcrop at Adrian, East Franklin township.
20. Outcrop at Sherrett, Washington township.
21. Outcrop 1 mile north of French Corners, Washington township.
22. Pine Creek Coal Company. Pine Creek mine, ¼ mile northeast of Dickey Station, Washington township.
23. Leet Coal Company. Leet mine, 1 mile southwest of Mahoning, Washington township.
24. Kittanning Mining Company. Peach Hill mine, at Peach Hill, Washington township.
25. W. J. James. Van Buren mine, ¾ mile west of Redbank, Washington township.
26. Outcrop at East Brady, Bradys Bend township.
27. Outcrop opposite Phillipston, Bradys Bend township.
28. Queenstown Coal Company. Frazer mine, on Sugar Creek, 1 mile northwest of East Brady, Bradys Bend township.
29. Bradys Bend Coal Company. Bradys Bend mine, 1 mile north of Laceys, Bradys Bend township.
30. Country bank, 1 mile northwest of Widnoon, Madison township.
31. Outcrop 1 mile east of Grays Eddy, Madison township.
32. Rimerton Coal Company. Rimerton mine, 1 mile south of Rimerton Station, Madison township.
33. Willow Island Coal Company. Willow Island mine, on Redbank Creek west of Lawsonham, Madison township.
34. Widnoon Coal Company. Widnoon mine, 1 mile southeast of Lawsonham, Madison township.
35. Duncan Coal Company. Duncan mine, 1 mile east of Lawsonham, Madison township.

36. Allegheny River Mining Company. Chickasaw mine, at Chickasaw on Tidal Branch of P. R. R., Madison township.
37. Pine Run Coal Company. Fairmount No. 5 mine (abandoned), ½ mile southeast of New Bethlehem, Mahoning township.
38. Country bank, 2 miles northeast of Eddyville, Redbank township.
39. Oak Ridge Mining Company. Oak Ridge No. 8 mine, ¾ mile southwest of Oak Ridge Station, Redbank township.
40. Barger & Joyce Coal Company. Fern No. 1 mine, ¼ mile south of Oak Ridge Station, Redbank township.
41. Armstrong Coal Company. Armstrong No. 1 mine, 3 miles east of New Bethlehem, on Redbank Creek.
42. Taylor Coal Company. Taylor No. 1 mine, ¼ mile southwest of Hawthorn Station, Redbank township.
43. Pine Run Coal Company. Pine Run No. 4 mine, on Pine Run, 6 miles south of Hawthorn, Redbank township.
44. Bailey & Brown Mining Company. Eagle mine, ¼ mile northeast of Eddyville Station, Redbank township.
45. Rose & McGregor Coal Company. Charleston No. 2 mine, at McWilliams, P. & S. R. R., Redbank township.
46. McGregor Coal Company. McGregor No. 2 mine, on Pine Creek, 1 mile west of Timblin, Redbank township.
47. Outcrop, ⅓ mile east of Templeton, Pine township.
48. Outcrop, 1 mile south of Mahoning, Pine township.
49. Outcrop, ½ mile north of Oscar, Boggs township.
50. Outcrop on Scrubgrass Creek, 2 miles southeast of Goheenville, Wayne township.
51. Outcrop on Scrubgrass Creek, ¾ mile southeast of Goheenville, Wayne township.
52. Outcrop on Hays Run, Rayburn township.
53. Valley Mining Company. Dominion No. 3 mine, on east bank of Allegheny River near mouth of Hays Run, Rayburn township.
54. Melrose Coal Mining Company. Melrose mine, ⅓ mile north of Cowanshannock Station, Rayburn township.
55. A. G. & S. Mining Company. Brilliant No. 3 mine, 1 mile southeast of Cowanshannock Station, Rayburn township.
56. Consumers Coal Company. Markle mine, in northern Kittanning borough.
57. McNees-Reese Coal Company. McNees mine, ¼ mile northeast of Kittanning Station. Manor township.
58. Kittanning Steam Coal Company. Buffington No. 1 mine, ⅓ mile south of Kittanning Station, Manor township.
59. Baxter Coal Company. Baxter mine, on south Kittanning borough line.

Middle Kittanning (C) Coal.

The Middle Kittanning bed lies 45 to 55 feet above the Lower Kittanning coal. It is persistent in the county, but rarely is thick enough to be mined profitably. The coal is clean and averages about 12 inches thick. One mile west of Cowansville, where exposed by stripping, it is 2 feet thick. The same thickness is indicated by its outcrops on Allegheny River, Mahoning and Redbank creeks. Its blossom again shows in the vicinity of Sherrett, Morrows Corner, and Adrian. One mile south of Mahoning Furnace the bed is about 2 feet 3 inches thick. In the southern and central parts of the county it averages less than 12 inches, but in the northeastern part of the county it is persistent, and locally is minable. On the North Fork of Pine Creek the coal is 2 feet thick where stripped, and a mile farther up the creek is 3 feet thick. The coal has been mined near Echo. On the South Fork of Pine Creek, two miles above Echo where the railroad crosses North Branch the Middle Kittanning coal is 2 feet 8 inches thick. Two miles farther up the creek in an old opening it is 5 feet thick, but is very dirty and high in sulphur. The bed has the same character at Waltersonville.

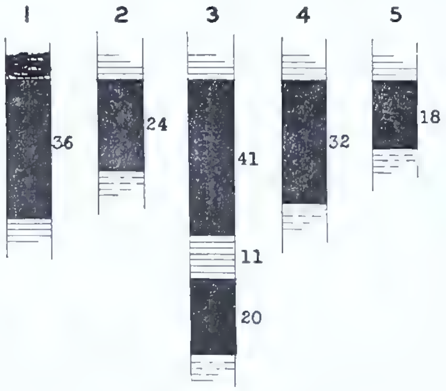


Figure 12. Sections of Middle Kittanning coal in Armstrong County.

1. Crissman Coal Company. Crissman mine, ¼ mile north of Lacys, Bradys Bend township.
2. Outcrop on north fork of Pine Creek, Boggs township.
3. Outcrop on Kline farm between Echo and Belknap.
4. Outcrop on north branch 2 miles northeast of Echo.
5. Outcrop 1½ miles east of Stone House, Valley township.

UPPER KITTANNING (C′) COAL.

The Upper Kittanning coal, lying about 50 feet above the Middle Kittanning bed, is not a typical high volatile coal. Locally, especially in the northeastern part of the county, part of the bed is cannel coal. The coal occurs in long narrow troughs, evidently old stream channels. In these troughs the lower part of the bed, usually about 2 feet thick, is overlain by cannel coal, which is 5 to 13 feet thick in the axis of the trough, but thins to a feather edge on both sides. The average width of the minable coal area is usually not over 600 to 800 feet. Unlike typical cannel, this coal, instead of having 45 per cent or more of volatile hydrocarbons, and a less amount of fixed carbon, has about 1½ times more fixed carbon than volatile matter. It is also very high in ash.

The bed is minable in the vicinity of Sherrett and Peach Hill, at Somerville, at Kaylor, and possibly also on Cove Run. At Somerville the coal and cannel shale is 13 feet thick in the center of a trough. The coal is thickest and best in Mahoning and Redbank townships, where it occurs in several apparently isolated deposits of unusual thickness. It consists of cannel coal and bituminous coal in two to four benches. On Cathcart Run, and in other localities between Putneyville and South Bethlehem, the bed is locally 15 feet thick and is composed of four benches, two of bituminous, and two of cannel coal. On the east side of Little Mudlick Creek, the Upper Kittanning coal has a maximum thickness of 13 feet 11 inches, 8 feet of which is cannel coal. In the Pine Creek region the coal has a persistent thickness of approximately 2 feet 9 inches. It was once mined on the

South Fork of Pine Creek, near Pine Furnace, and is 2 feet 8 inches thick. Farther up Pine Creek, on the road to Goheenville, the coal measures 2 feet; at Echo, 2 feet 6 inches, and on Cowanshannock Creek 12 inches to 3 feet. The Upper Kittanning coal is thin on Kiskiminetas River. It is 2 feet thick at Girty, and Cochran Mills on Crooked Creek. On Cherry and Carnahan runs the bed has a maximum thickness of 3 feet, but averages much less.

The Upper Kittanning coal is principally used for local fuel; most of the commercial mines are along Kiskiminetas and Allegheny rivers. Large operations in the northern part of the county have failed because the extreme irregularity of the bed makes mining unprofitable.

The following sections are typical of the Upper Kittanning in Armstrong County:

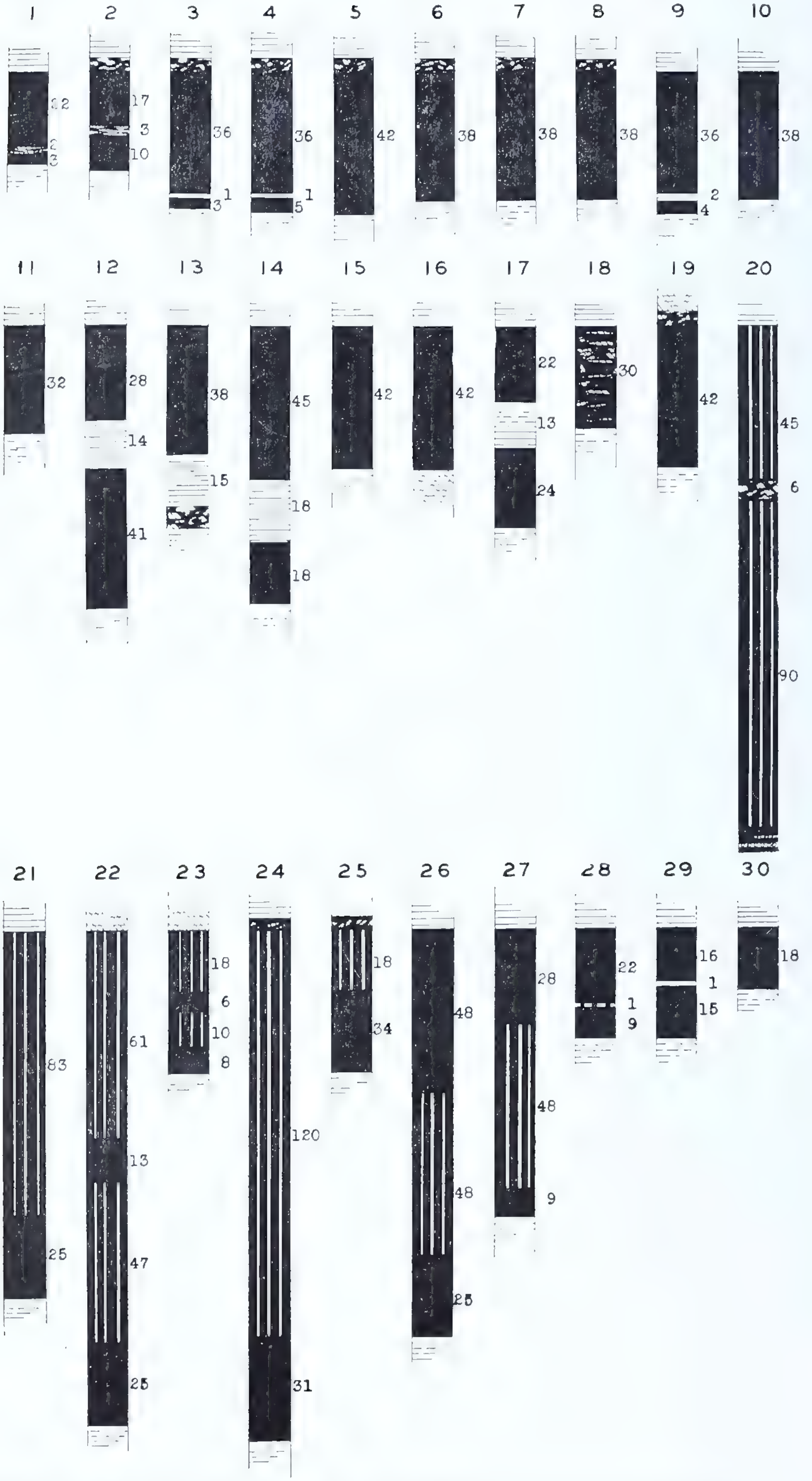


Figure 13. Sections of Upper Kittanning coal in Armstrong County.

1. Outcrop on Crooked Creek, at Cochran Mills, Burrell township.
2. Outcrop on Cherry Run, ½ mile north of Cochran Mills, Burrell township.
3. Saltsburg Colliery Company. Foster No. 5 mine, on north bank of Kiskiminetas River, 1¾ miles southeast of mouth of Roaring Run, Kiskiminetas township.
4. Saltsburg Collieries Company. Foster No. 9 mine, 1¼ miles southeast of mouth of Roaring Run, opposite Truxel Station, Kiskiminetas township.
5. Trucks Coal Company. Trucks No. 1 mine, ¼ mile southeast of mouth of Roaring Run, Kiskiminetas township.
6. Conemaugh Kiski Coal Company. Freeport No. 1 mine, 2 miles south of Apollo, Kiskiminetas township.
7. Johnetta Brick and Coal Company. Johnetta mine, at Johnetta, Gilpin township.
8. Orpha Coal Company. Orpha mine, opposite Logansport, on Allegheny River, South Buffalo township.
9. Ferguson Coal Company. Ferguson No. 1 mine, on west bank of Allegheny River, 1 mile north of Logansport.
10. Reed-Rudolph Coal Company. Reed No. 2 mine, ¼ mile north of Logansport on east bank of Allegheny River, Bethel township.
11. Outcrop 1 mile northeast of French's Corners, Washington township.
12. Outcrop at Cowansville, East Franklin township.
13. Outcrop, south of Sherrett, Washington township.
14. Outcrop, at Peach Hill, Washington township.
15. Outcrop ½ mile south of Sherrett, Washington township.
16. Country bank, at Somerville, Sugar Creek township.
17. Trimbaugh mine, on Long Run, Bradys Bend township.
18. Outcrop at Tidal, Madison township.
19. Country bank, east of the Narrows on Redbank Creek, Madison township.
20. Fairmount Coal & Coke Company. Bostonia No. 8 mine, 2 miles south of New Bethlehem, Mahoning township.
21. Fairmount Coal & Coke Company. Bostonia No. 9 mine, 2½ miles south of New Bethlehem, Mahoning township.
22. Pine Run Coal Company. Brooks No. 1 mine, on Cathcart Run, ¾ mile northeast of Nitro Station, Mahoning township.
23. Pine Run Coal Company. Brooks No. 1 mine, on Cathcart Run, ¾ mile northeast of Nitro Station, Mahoning township. (to illustrate variability in thickness).
24. Pine Run Coal Company. Pine Run No. 3 mine (abandoned), on Little Mudlick Creek, 3½ miles south of Hawthorne Station, Redbank township. (Maximum thickness).
25. Pine Run Coal Company. Pine Run No. 3 mine. (Minimum thickness).
26. Thompson bank on Little Mudlick Creek, Redbank township.
27. Wynkoop bank on Little Mudlick Creek, Redbank township.
28. Outcrop at Pine Furnace, Valley township.
29. Country bank at Echo, Wayne township.
30. Outcrop on Mill Run, North of McNees, Kittanning township.

LOWER FREEPORT (D) COAL.

The Lower Freeport coal normally lies 35 to 55 feet above the Upper Kittanning coal. The interval is exceedingly variable on Allegheny River, and has led to an evident confusion of these two beds especially in the vicinity of Freeport. This problem must remain unsolved until more detailed work has been done in that area.

The Lower Freeport coal is extremely variable in thickness west of Allegheny River and is mined principally for local use. At Cowansville and southward along Glade and Limestone runs and along the Allegheny the bed is locally 3 feet thick. The coal is persistent east of Allegheny River. Where minable it is 2 to 4 feet thick, and is a bright clean coal. In Madison, Mahoning, and Redbank townships the coal has a local maximum thickness of 4 feet 6 inches. In several areas the coal averages 3 feet thick. Locally a 2 inch bony parting, high in sulphur, divides the bed into two benches.

In Pine, Boggs, Wayne, Valley, and Reyburn townships the coal has a local maximum thickness of 3 feet, but averages much less. It averages 2 feet thick in the southern part of the county and on the Kiskiminetas.

On Cowanshannock Creek the bed has fair thickness and the coal is clean. It is mined principally for local use. At Yatesboro the bed is 4 feet 6 inches thick, including a local 2-inch shale parting. On the South Fork of Pine Creek it is from 2 feet to 2 feet 6 inches thick. On the North Fork of Pine Creek, its average thickness is 1 foot 9 inches, with a maximum of 2 feet 6 inches. It is thin on Mahoning Creek, but north of Putneyville it is nearly 4 feet thick, including two thick bone partings near the roof and the bottom. The bed is 3 feet 10 inches thick on Redbank Creek. A 3-inch bony parting separates an upper bench 16 inches thick from a lower one 2 feet 3 inches thick. At South Bethlehem it ranges from 3 feet 6 inches to 6 feet, but the coal is locally extremely shaly, and carries much pyrite.

The Lower Freeport coal averages about 33.5 per cent volatile matter, 52 per cent fixed carbon, 8 per cent ash, and 2.5 per cent sulphur. It is typical high volatile coal, and after the thicker and more persistent beds have been exhausted will have much value for gas manufacture.

The following sections are typical of the Lower Freeport in Armstrong County:

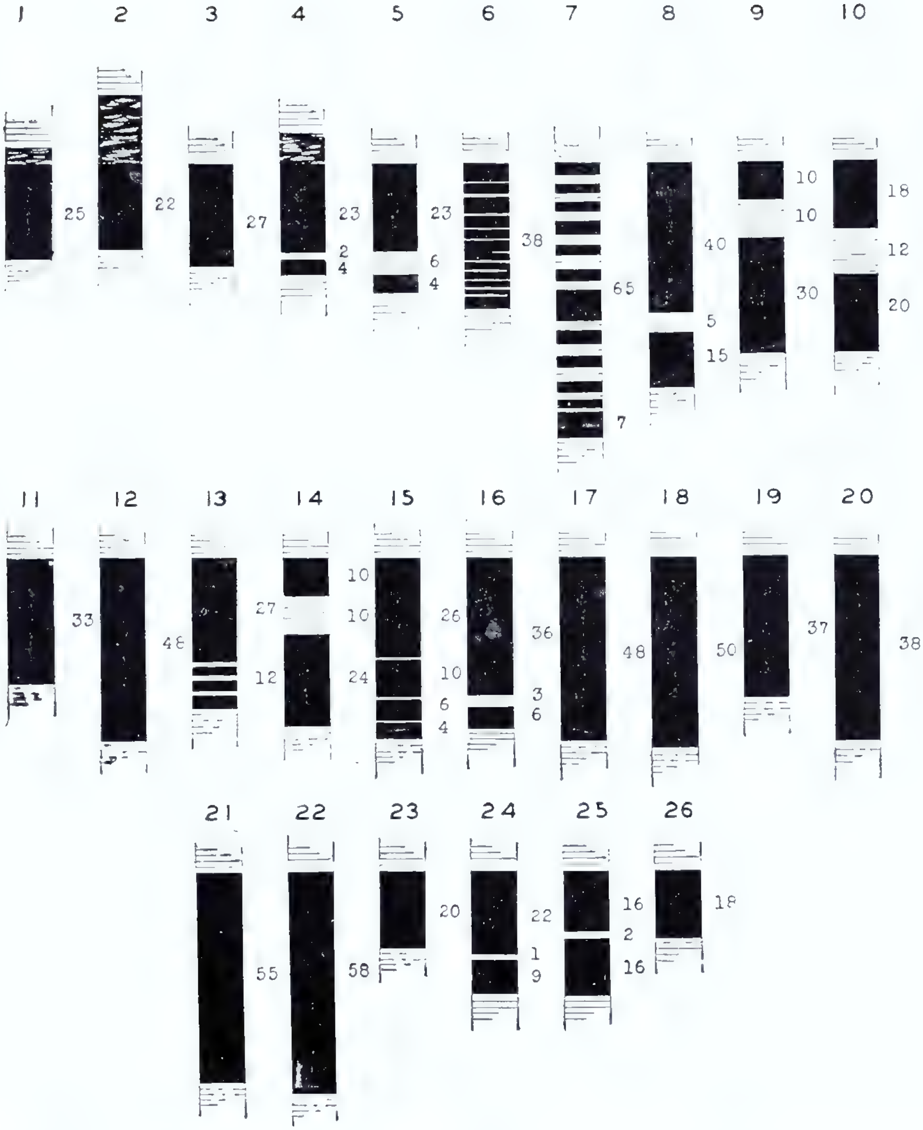


Figure 14. Sections of Lower Freeport coal in Armstrong County.

1. Outcrop at Girty, on Crooked Run, South Bend township.
2. Outcrop on Crooked Creek at Cochran Mills.
3. Outcrop on Elbow Run, 1 mile southwest of Shay.
4. Outcrop at Edmon, Kiskiminetas township.
5. Outcrop ¼ mile east of Apollo, Kiskiminetas township.
6. Outcrop on Allegheny River, at Godfrey Station, Gilpin township.
7. Ferguson Coal Company. Ferguson No. 2 mine, on west side of Allegheny River 1 mile north of Logansport, South Buffalo township.
8. Allegheny River Mining Company. Cadogan No. 4 mine, at Cadogan, South Buffalo township.
9. Renee Coal Company. Benson mine, at Kelly Station, Bethel township.
10. Reed-Rudolph Coal Company. Reed mine, ½ mile north of Logansport, Bethel township.
11. Wolfe Coal Company. Wolfe mine, ½ mile northwest of Ford City, North Buffalo township.
12. Country bank at Walkchalk, East Franklin township.
13. Outcrop, southeast corner of East Franklin township.
14. Excelsior Coal Company. Kelly mine, at Kelly Station, Bethel township.
15. Kittanning Iron & Steel Company. Reyburn No. 1 mine, 3 miles north of Kittanning, on P. R. R., Reyburn township.

16. Outcrop, 1 mile northeast of Kittanning, Reyburn township.
17. Outcrop on Peach Hill, Washington township.
18. Outcrop, east of Cowansville, Washington township.
19. Pine Run Coal Company. Fairmount No. 3 mine (abandoned), 1 mile east of New Bethlehem, Madison township.
20. Fairmount Coal & Coke Company. Fairmount No. 6 mine, 2½ miles southwest of New Bethlehem, Madison township.
21. Cowanshannock Coal & Coke Company. Yatesboro No. 2 mine, ¼ mile southwest of Yatesboro, Cowanshannock township.
22. Cowanshannock Coal & Coke Company. Yatesboro No. 3 mine, ½ mile southwest of Yatesboro, Cowanshannock township.
23. Cowanshannock Coal & Coke Company. Yatesboro No. 9 mine, 3 miles southwest of Yatesboro, Cowanshannock township.
24. Outcrop, at Pine Furnace, Valley township.
25. Country bank at Echo, Wayne township.
26. Outcrop at McNees, Kittanning township.

UPPER FREEPORT (E) COAL.

The Upper Freeport coal, lying between 35 and 55 feet above the Lower Freeport coal, is of great economic importance in the county. In the northwestern part of the county it ranks next to the Lower Kittanning, underlies large areas and has a maximum thickness of 4 feet. Although it is locally thin and dirty it averages over 3 feet thick. In the eastern and northeastern part of the county the Upper Freeport is the most important coal. It is very persistent, but in a few places is too thin to mine. In the southern part of the county it is known as the Four Foot coal, although it averages only 3 feet 3 inches thick. A maximum thickness of 4 feet 6 inches is uncommon.

In the vicinity of Bradys Bend and Queenstown the Upper Freeport bed is divided into four benches by shale and bone partings that lessen its value. The bed averages 2 feet 9 inches thick, and is a bright good coal. Locally it is more than 4 feet thick. At Karns it is 5 feet thick; above the railroad tunnel on Long Run 4 feet 2 inches; half a mile east of Fenelton 3 feet 9 inches; at Bradys Bend 4 feet 2 inches; at Leet, 4 feet thick, but very impure. It is 3 feet 9 inches thick at Sherrett. It is mined at Cowansville, where it averages 3 feet 3 inches thick. Locally two thin binders are present, otherwise the coal is clean. The coal is 3 feet thick at Nichola, and 3 feet 4 inches thick at Worthington. The bed averages 3 feet thick in the townships west of the Allegheny, and south and west of Kittanning, and is very regular. The coal is generally clean, but locally has two or three thin bone partings and pyrite lenses. Locally, 3 or 4 inches of the bottom coal is too dirty to be mined profitably.

The coal has been eroded in large areas in the northeastern townships. In the southern part of Madison township and in Pine township the coal is locally 5 feet 4 inches thick. It is lenticular, but averages 3 feet thick; a local band of pyrite, from 1 to 2 inches thick, increases the sulphur content. The coal is very persistent and regular in thickness in Mahoning and Redbank townships, ranging from 3 feet to 4 feet 4 inches, and averaging about 3 feet 4 inches thick. Locally there are one or two thin bone binders in addition to a 3-inch bone parting 8 inches from the bottom. In a few mines there are 4 to 6 inches of bone coal at the top of the bed. North of Deanville the Upper Freeport is 4 feet 4 inches thick, including 1 to 2 inches of bone coal at the top, and a thin parting 12 inches above the bottom; at Seminole, 3 feet 8 inches thick, including two 1-inch bone partings near the bottom; at South Bethlehem, 4 feet thick. It was once coked at Mahoning Furnace where it is 3 feet 11 inches thick. The coke was too tender for shipment. At McWilliams the bed is 4 feet 1 inch thick, not including 6 or 8 inches of bone coal at the top of the bed.

On Allegheny River in Boggs township the Upper Freeport coal averages 2 feet 8 inches thick and is free from partings and binders. Pyrite lenses are numerous in some places. The coal thickens eastward into Wayne township, averaging 3 feet 4 inches. Pyrite lenses are numerous in some places. The coal thickens eastward into Wayne township, averaging 3 feet 4 inches. Two miles east of Goheenville the thickness is the same, with no partings, but the percentage of sulphur is high. At McCrea Furnace it is 4 feet thick, including a thin parting near the middle of the bed. The coal is confined to isolated patches on the highest hilltops on the headwaters of Pine Creek. On a high knob one mile east of Muff, the coal is 4 feet 4 inches thick, separated into two benches by a 1-inch pyrite binder in the middle of the bed. The top is dirty. The coal is 3 feet 4 inches thick where mined at Dayton, including a ½-inch parting of bone coal and pyrite near the middle. The coal thickens to 4 feet 4 inches between Dayton and Echo, but is very dirty. At Echo the bed is 4 feet 2 inches thick, with a ½ to 2 inch bone coal parting 4 to 10 inches from the bottom. The bed is also bony at the top.

In Cowanshannock township the bed is extremely variable in thickness. At Sagamore it measures 6 feet, including a 6-inch bone parting near the middle, a 1-inch shale parting near the bottom, two pyrite bands and 5 inches of bony coal at the top of the bed. At Yatesboro the bed is 4 feet 2 inches thick, including 6 inches of bony coal at the top, and a ½ to 2 inch bone parting 4 to 8 inches from the bottom.

In Reyburn and Valley townships the Upper Freeport averages 2 feet 8 inches thick, and carries no distinct impurities except local lenses of pyrite. On Garrett Run and in Kittanning and Manor townships the coal thickens locally to 6 feet 6 inches, including five thin partings. The average thickness is less than 3 feet. One mile north of Heilman the coal is 3 feet 11 inches thick, with 9 inches of bone at the top. Half a mile east of McNees the bed is 3 feet

8 inches thick, including several small clay partings. Half a mile east of Blanket Hill the coal thins to 2 feet under a heavy sandstone.

The Upper Freeport coal averages over 3 feet thick in Manor, Bethel, Gilpin, and Parks townships. It ranges from 2 feet to 4 feet 6 inches thick, including local partings of bone and pyrite which are 6 inches thick in places. A few inches of bone coal at the top is very common.

In the southeastern townships the Upper Freeport coal has great importance. It ranges from 2 feet 6 inches to 5 feet thick in Kiskiminetas township and averages about 3 feet 9 inches. Small persistent bone partings lessen its value. At Apollo it is divided into two benches by a 1 to 2 inch bone parting. The upper bench is 2 feet 4 inches to 3 feet thick; the lower one 12 to 18 inches thick. The upper bench is good clean coal, but the lower one is dirty. The bed is persistently 4 feet thick on Roaring Run, and carries a small parting, usually not more than 1 inch thick. The bed is 7 feet 2 inches thick on Long Run, but has two partings, one 2 inches thick, and the other 18 inches.

The coal averages about 3 feet thick in South Bend, Burrell, and Plumcreek townships, and is an important coal on Crooked and Plum creeks. The bed is seldom free from partings of bone and sulphur. In some places the top of the bed is bony.

The Upper Freeport coal in Armstrong County is one of the largest reserves of high volatile coal in the State. Large areas have not been mined, and some are not as yet prospected. With improved methods of picking and washing the coal, Armstrong County will become the center of gas coal production in the State.

Average composition of the Upper Freeport coal.

	Per cent	
	Range	Average
Volatile matter	33-36	34
Fixed carbon	52-57	54
Ash	5-12	7
Sulphur	1-4	2.1

The coal is soft, friable, brilliant in lustre, and breaks up when mined.

The following sections illustrate the occurrence of the Upper Freeport coal in Armstrong County:

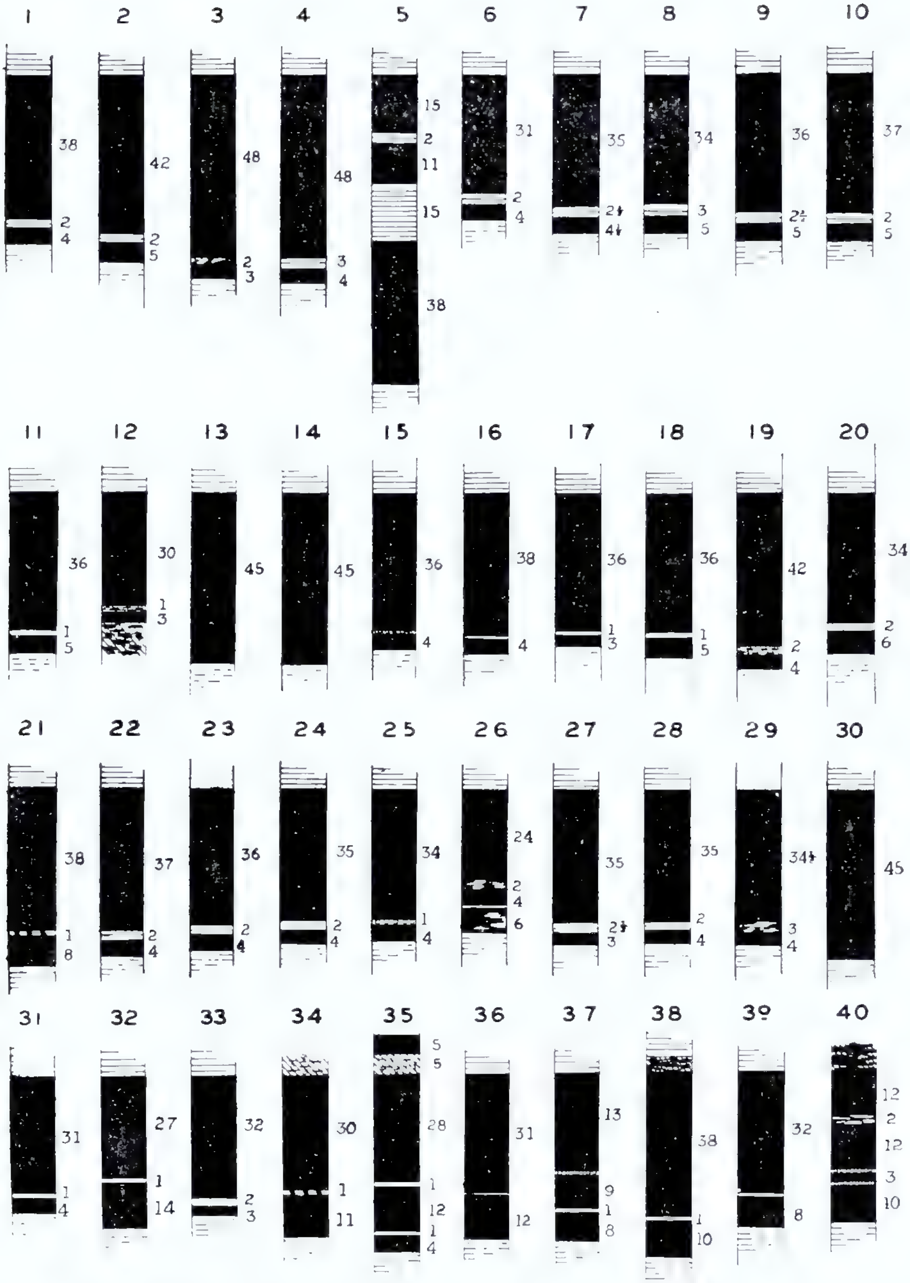


Figure 15. Sections of Upper Freeport coal in Armstrong County.

1. Outcrop, at Apollo, Kiskiminetas township.
2. Trucks Coal Company. Trucks No. 2 mine, ¼ mile east of Roaring Run Station, Kiskiminetas township.
3. Saltsburg Collieries Company. Foster No. 8 mine, 1 mile southeast of Roaring Run Station, Kiskiminetas township.
4. Saltsburg Collieries Company. Foster No. 4 mine, 1¼ miles southeast of Roaring Run Station, Kiskiminetas township.
5. Outcrop on Grey farm, on Long Run, Kiskiminetas township.
6. Climax Coal Company. Climax mine, 1,200 feet east of North Vandergrift, Parks township.
7. Northside Coal Company. Northside mine, at North Vandergrift, Parks township.

8. Beck & Boale Coal Company. Beck No. 1 mine, on Kiskiminetas River opposite Vandergrift, Parks township.
9. Stickel Coal Company. Stickel mine, ¼ mile east of Vandergrift bridge, on north bank of Kiskiminetas River, Parks township.
10. Kepple Coal Mining Company. Kepple mine, 1 mile west of Vandergrift, Parks township.
11. Park Coal Company. Park mine, 1¼ miles south of mouth of Guffy Run, Parks township.
12. Gladys Coal Mining Company. Gladys mine, ¾ mile northeast of Hyde Park, Parks township.
13. Armstrong County Coal Company. Armstrong mine, at Hyde Park Station, Gilpin township.
14. American Sheet & Tin Plate Company. Kirkpatrick mine, at Leechburg, Gilpin township.
15. West Leechburg Steel Company. West Leechburg Steel Co. No. 2 mine, ¾ mile north of Leechburg, Gilpin township.
16. Haddon Coal Company. Haddon mine, 1¾ miles northwest of Leechburg, Gilpin township.
17. Elder Run Coal Company. Elder Run mine, at mouth of Elder Run, ½ mile east of Bagdad, Gilpin township.
18. Avonmore Coal & Coke Company. Gilpin mine, on north bank of Kiskiminetas River, ¾ mile north of Blackstone, Gilpin township.
19. Bagdad Coal & Coke Company. Bagdad mine, 1¼ miles east of Kiskiminetas Junction, Gilpin township.
20. Aladdin Coal & Coke Company. Aladdin mine, 1 mile north of Kiskiminetas Junction, Gilpin township.
21. Donley Coal Company. Donley mine, 1 mile east of Aladdin, Gilpin township.
22. Clark Coal Company. Clark No. 2 mine, ¼ mile southeast of Godfrey Station, Gilpin township.
23. Clark Coal Company. Clark No. 1 mine, ¼ mile southeast of Godfrey Station, Gilpin township.
24. Freeport Brick Company. Freeport Brick mine, on Buffalo Creek, ¼ mile north of Freeport, South Buffalo township.
25. Winfield Coal Corp. Winfield mine, on Buffalo Creek, ½ mile north of Iron Bridge Station, South Buffalo township.
26. Armable Coal Company. Armable mine, 1¼ miles north of Iron Bridge Station, South Buffalo township.
27. T. B. Young Coal Company. Century No. 1 mine, in Dock Hollow, opposite mouth of Kiskiminetas River, South Buffalo township.
28. Century Coal Company. Century No. 3 mine, in Dock Hollow, 1½ miles northeast of Freeport, South Buffalo township.
29. Knapps Run Coal Company. Knapps Run mine, on Allegheny River near Knapps Run, South Buffalo township.
30. Dover Coal Company. Dover mine, 7½ miles south of Kittanning and ¾ mile northwest of Logansport, South Buffalo township.
31. Ferguson Coal Company. Ferguson No. 3 mine, 1 mile northwest of Logansport, South Buffalo township.
32. Taylor Run Coal Company. Taylor Run mine, at Kelly Station, Bethel township.
33. Woodbine Coal Company. Haupt mine, ¼ mile east of Kelly Station, Bethel township.
34. Stauffer Kittanning Coal Company. Stauffer mine, at Kelly Station, Bethel township.
35. Ravidan East Brady Coal Company. Ravidan mine, at Logansport, Bethel township.
36. Frauenheim-Logansport Coal Company. Bethel mine, at Logansport, Bethel township.
37. McKelvy-McFadden Coal Company. McKelvy mine, on Garrett Run, 1½ miles east of mouth, Manor township.
38. G. E. Cogley. Cogley mine, on Garrett Run, 2 miles south of Kittanning, Manor township.
39. Pryor Coal Company. Pryor mine, 1 mile southeast of Garretts Run Station, Manor township.
40. Garretts Run Coal Company. Toy Nos. 1 and 2 mines, at Garretts Run Station, Manor township.
41. Kittanning Steam Coal Company. Buffington No. 2 mine, ⅓ mile south of Kittanning Station, Manor township.
42. Kittanning Iron & Steel Mfg. Company. Reyburn No. 2 mine, 1 mile northeast of Cowanshannock Station, Reyburn township.
43. Wallwork Mining Company. Mosgrove No. 3 mine, at Mosgrove, Reyburn township.
44. Harbison-Walker Refractories Company. Harbison-Walker No. 2 mine, ¾ mile south of Templeton Station, Pine township.
45. Fairmount Coal & Coke Company. Bostonia No. 10 mine, 2 miles south of New Bethlehem on low grade branch of Pennsylvania Railroad, Mahoning township.

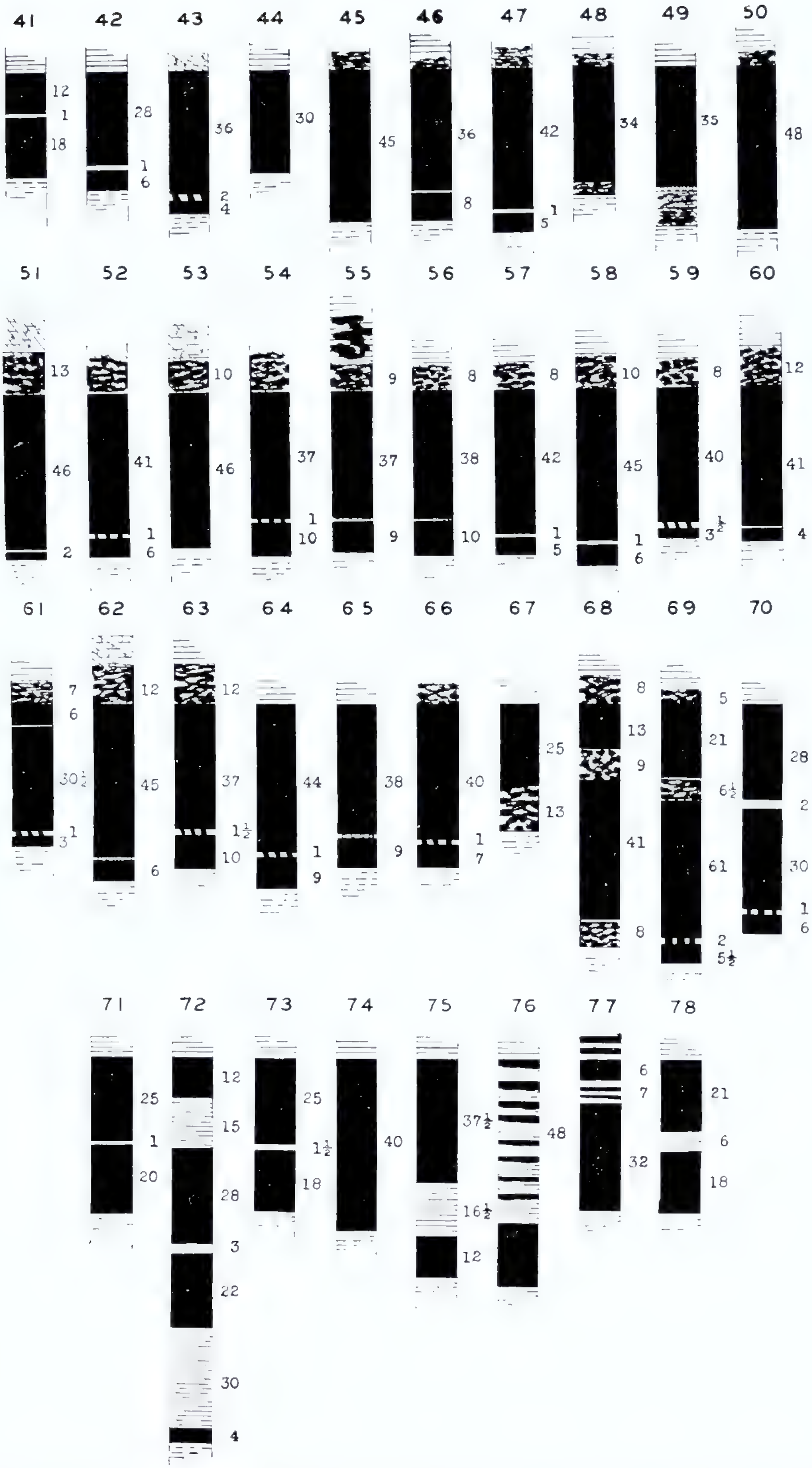


Figure 16. Sections of Upper Freeport coal in Armstrong County.

46. Allegheny River Mining Company. Seminole No. 1 mine, at Seminole, Mahoning township.
47. Dinmor Coal Company. Dinmor No. 1 mine, at Oakland, Mahoning township.
48. Mahoning River Mining Company. Thayerton mine, at Thayerton, Mahoning township.
49. Reid Coal Company. Reid No. 1 mine, ½ mile east of Colwell Station, Mahoning township.
50. Sandy Junction Coal Company. Sandy Hollow No. 1 mine, at Oakland Junction, Mahoning township.
51. Parbac Coal Company. Putneyville No. 1 mine, ¼ mile north of Putneyville Station, Mahoning township.
52. Freeport and Mahoning Coal Company. Ruth No. 1 mine, ¼ mile northwest of Nitro Station, Mahoning township.
53. Pine Run Coal Company. No. 5 mine, on Pine Run, 6 miles south of Hawthorne, Redbank township.
54. Charleston Coal Company (abandoned). Charleston No. 1 mine, ½ mile north of McWilliams Station on P. & S. R. R., Redbank township.
55. Elder Mining Company. Elder mine, 1 mile southeast of McWilliams Station, on P. & S. R. R., Redbank township.
56. McGregor Coal Company. McGregor No. 1 mine, 1 mile northwest of Timblin, Redbank township.
57. Summit Coal Mining Company. Summit No. 1 mine, ¼ mile northwest of Dayton, Wayne township.
58. Summit Coal Mining Company. Summit No. 4 mine, 1 mile northeast of Dayton, Wayne township.
59. Summit Coal Mining Company. Summit No. 5 mine, 1¼ miles northeast of Dayton, Wayne township.
60. Summit Coal Mining Company. Summit No. 3 mine, 1 mile southeast of Dayton, Wayne township.
61. Lumsted Mining Company. Lumsted No. 1 mine, on South Branch of south fork of Pine Creek, 1 mile south of Echo, Cowanshannock township.
62. Cowanshannock Coal & Coke Company. Yatesboro No. 5 mine, 3 miles east of Yatesboro, Cowanshannock township.
63. Cowanshannock Coal & Coke Company. Yatesboro No. 4 mine, ¼ mile north of Yatesboro Station, Cowanshannock township.
64. Cowanshannock Coal & Coke Company. Yatesboro No. 10 mine, 2½ miles southwest of Yatesboro, Cowanshannock township.
65. Cowanshannock Coal & Coke Company. Yatesboro No. 8 mine, 3 miles southwest of Yatesboro, Cowanshannock township.
66. Cowanshannock Coal & Coke Company. Blaco mine, at Blaco, Cowanshannock township.
67. Atwood Coal Company. Atwood mine, 1½ miles southwest of Sagamore on north branch of Plum Creek, Cowanshannock township.
68. Buffalo & Susquehanna Coal & Coke Company. No. 18 mine, at Sagamore, Cowanshannock township.
69. Buffalo & Susquehanna Coal & Coke Company. No. 17 mine, at Sagamore, Cowanshannock township.
70. Buffalo & Susquehanna Coal & Coke Company. No. 13 mine, at Sagamore, Cowanshannock township.
71. Outcrop on Sugar Creek, Bradys Bend township.
72. Outcrop at Bradys Bend, Bradys Bend township.
73. Outcrop 1 mile west of Sherrett, Washington township.
74. Outcrop above railroad tunnel, Long Run, West Franklin township.
75. Outcrop 2 miles northwest of Walkchalk, East Franklin township.
76. Outcrop 1 mile south of Walkchalk, East Franklin township.
77. Outcrop 2 miles south of Weskit, North Buffalo township.
78. Outcrop 1 mile west of North Buffalo, North Buffalo township.

Mahoning Coal.

The Mahoning coal lies about 50 feet above the Upper Freeport. It has a maximum thickness of 3 feet on Cherry Run. It is 18 inches thick on Crooked Creek, but has never been mined.

Brush Creek Coal.

The Brush Creek coal, lying about 90 feet above the Upper Freeport coal, is persistent in the area west of Allegheny River, where it averages about 15 inches thick. Near Worthington it is 2 feet thick.

On Crooked Creek the bed is locally 2 feet 6 inches thick, but very lenticular. It has a reported thickness of 2 feet 6 inches on the headwaters of Hays Run, in Reyburn township. It has been opened near the headwaters of Cowanshannock Creek east of Rural Valley, and has a reported thickness of 1 foot 8 inches.

BAKERSTOWN COAL.

The Bakerstown coal lies about 160 feet above the Upper Freeport coal. Its outcrop has been noticed at many places in the county, but it does not average over 1 foot 8 inches thick. It is reported to be locally 4 feet thick on Crooked Creek. It has never been mined.

PITTSBURGH COAL.

The Pittsburgh coal bed lies about 650 feet above the Upper Freeport coal. Its occurrence is restricted to the highland on the southeastern border of the county in Kiskiminetas and South Bend townships, and is part of the most northern area of Pittsburgh coal in the State. The coal is slaty in some places and has many partings; in others it is clean and almost unbroken. It ranges from 6 to 10 feet thick, including its partings and roof coal. The roof coal is impure and is not mined. The lower division of the bed averages 7 feet thick, but the coal is pyritous and slaty. The impurities increase to the southwest. The coal is hard, mines out in cubical blocks, and stands transportation better than the soft Freeport coals. At Hicksville the lower division is 6 feet 10 inches thick, including a 2-inch shale parting, 2 feet 6 inches from the bottom. On Long Run it is 8 feet thick, but carries three thick shale partings. On Big Run it is 8 feet thick, including a 12-inch shale parting 5 feet from the bottom. On the headwaters of Harper Run the lower division is 8 feet 10 inches thick, including a 6-inch shale parting, 2 feet 4 inches from the bottom. The coal has numerous small knife blades of pyrite scattered through it. The coal belongs to the high volatile class. Its volatile matter averages 33.5 per cent; its fixed carbon 56 per cent; ash 9 per cent; and sulphur 3 per cent.

REDSTONE COAL.

The Redstone coal underlies a small area in the eastern part of South Bend and Kiskiminetas townships. It is about 40 feet above the Pittsburgh coal. The bed averages 15 inches thick, is very lenticular, and has not been mined anywhere in the county.

SEWICKLEY COAL.

The Sewickley coal is present only in the highest hilltops in eastern South Bend and Kiskiminetas townships. It lies 120 feet above the Pittsburgh, and varies from 12 inches to 5 feet thick, averaging less than 3 feet. The bed is much parted by bone and shale, making mining unprofitable.

CHAPTER III.

BEAVER COUNTY.

INTRODUCTION.

Beaver County is one of the smallest producers of bituminous coal in Pennsylvania. Although the county contains six coal beds that are locally valuable, they vary in thickness and quality, and their minable areas are small. At least two beds of clay associated with the coal beds are so useful that they greatly increase the value of the overlying coal.

Beaver County has ample transportation facilities to any point for its coal and industrial products. The Pennsylvania Railroad and the Pittsburgh and Lake Erie Railroad follow the Beaver and Ohio rivers; the Baltimore and Ohio crosses the northeastern part of the county.

The river valleys are densely populated, and have many miles of improved roads, over which much coal for local consumption is hauled.

Barges on Ohio River annually transport large quantities of coal from the southern part of the county.

Ohio and Beaver rivers, and their major tributaries flow through deep valleys. The slopes are abrupt at their base except where meandering streams have worn back their valleys, and formed broad flood plains. The slopes are more gentle on the water sheds. The rivers flow on transported glacial drift. The larger valleys have a series of five terraces on their slopes. Numerous hills and ridges with steep slopes and deep gulleys at their base are flat-topped and suggest the remnants of an old peneplain. A 500-foot rise of the strata from southeast to northwest restricts the Pittsburgh coal to a few hilltops in the southern part of the county, brings the Allegheny coals to outcrop along the Ohio, and even exposes the Pottsville series along the Beaver.

STRATIGRAPHY.

The Carmichaels group, composed of clays, sands, and gravels, occupies the old river channels.

The Monongahela group is restricted to a few hills in the southern part of the county. The upper part of the group has been eroded until only 50 feet of sandstones and shales remain above the Pittsburgh coal.

The Conemaugh group is largely composed of shales, with a few thin limestones and sandstones. The coals are thin and unimportant. Its average thickness is about 525 feet.

The Allegheny group has a large area in the county and contains workable coals. It averages about 325 feet thick and is composed of sandstones, shales, limestones, and valuable coal and clay beds.

The Pottsville is the lowest series exposed in the county. It is composed chiefly of a massive sandstone and shales, and its coals are of little value.

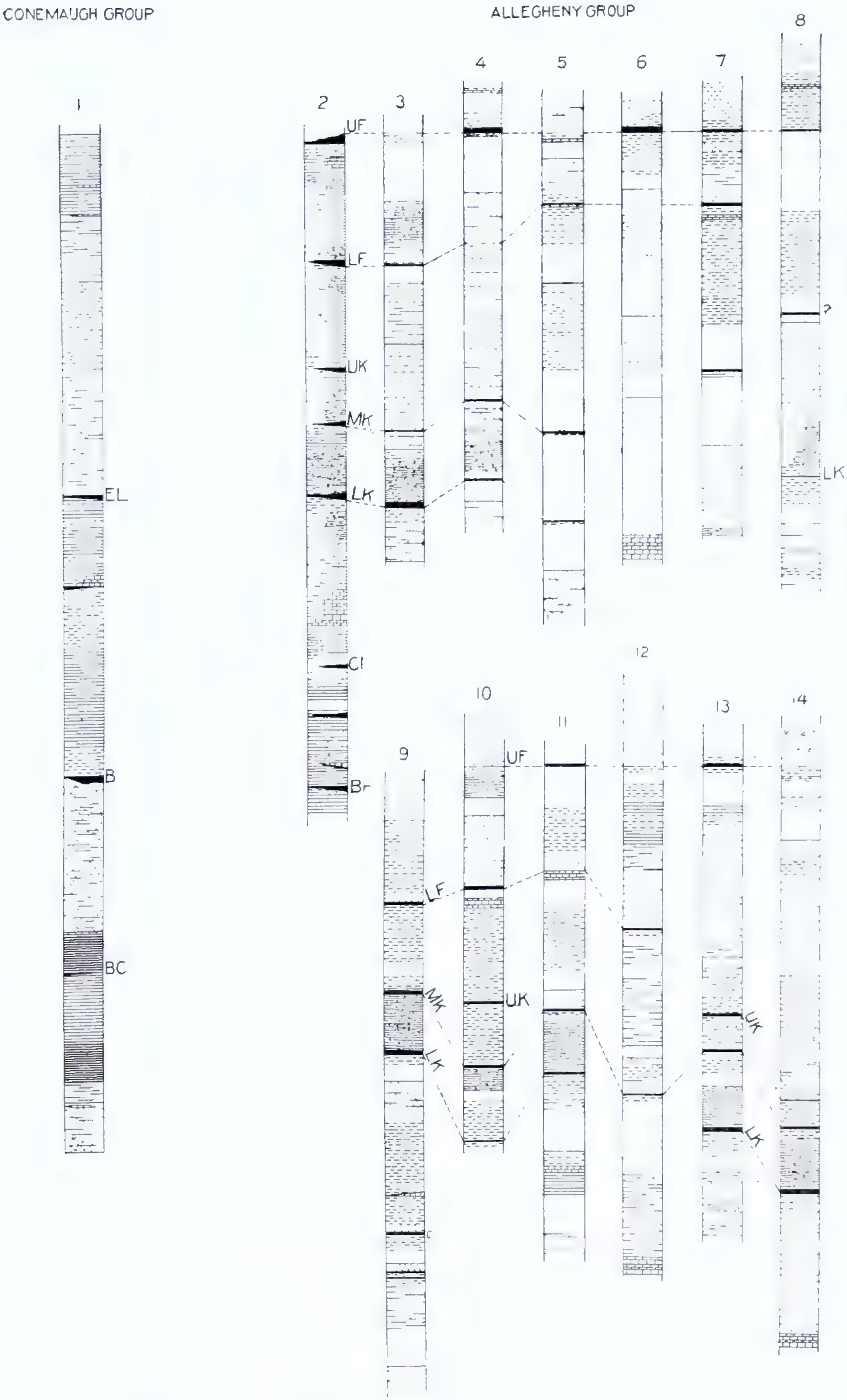


Figure 17. Stratigraphic sections, Beaver County.

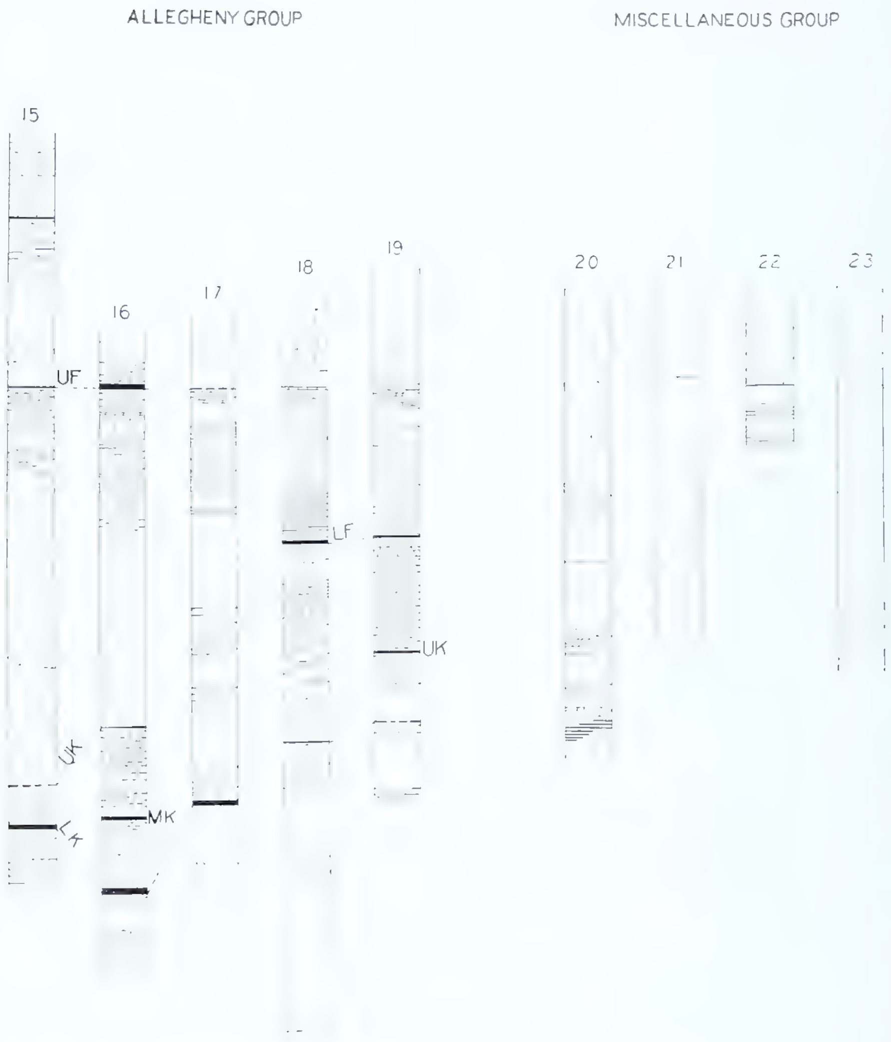


Figure 18. Stratigraphic sections cont'd. Beaver County.

		U. S. G. S.
1.	Generalized section of Conemaugh group.	Beaver Folio
2.	Generalized section of Allegheny group.	Beaver Folio
		Bulletins
3.	At Monaca.	286
4.	Doctor Heights, 1 mile west of.	286
5.	Dam No. 6, 1 mile southeast of.	286
6.	On Sugar Run, opposite Montgomery Island.	286
7.	At McDonaldtown.	286
8.	At Beaver Falls.	286
9.	On South Branch of Brady Run, 1 mile southwest of.	
10.	Patterson Heights.	286
11.	Fallston, ½ mile west of.	286
12.	On Beaver River, ½ mile north of Fallston.	286
13.	Vanport, 1 mile southwest of.	286
14.	On Fourmile Run. 1 mile northwest of Merrill.	286
15.	Industry, ⅓ mile west of.	286
16.	On Ohio River, ¼ mile south of Phillis Island.	286
17.	On Ohio River, 2 miles southeast of Georgetown.	286
18.	Smiths Ferry, ⅓ mile northeast of.	286
19.	Ohioville, ¾ mile southwest of.	286

20. Mouth of Clarks Run, Homewood Station, Big Beaver township. B. Coleman Renick, Correlation of the Lower Allegheny-Pottsville section in western Pennsylvania: Jour. Geol., vol. 32, No. 1, pp.64-80, 1924.
21. Mouth of Thompson Run, North Sewickley township. B. Coleman Renick.
22. At Bellton, North Sewickley township. B. Coleman Renick.
23. West Ellwood Junction, Big Beaver township. B. Coleman Renick.

COALS.

BROOKVILLE (A) COAL.

The Brookville has a limited outcrop in Beaver County. It has been mined at the mouth of Brady Run, where it is 2 feet 9 inches thick, with only 6 inches of clean coal. Along Beaver River the bed is in two benches 14 and 7 inches thick, separated by 3 feet of shale. In other parts of the county the coal is either below drainage or covered with glacial drift.

CLARION (A′) COAL.

This coal is persistent in Beaver County, but averages less than 6 inches.

SCRUBGRASS COAL.

The Scrubgrass coal is thin but persistent. The maximum thickness is 18 inches on the Connoquenessing, but at all other localities it is much less. The coal has good quality.

LOWER KITTANNING (B) COAL.

The Lower Kittanning has a maximum thickness of 3 feet 4 inches in Beaver County. It averages approximately 2 feet. It is lenticular and high in sulphur, particularly so east of Beaver River, where it is known as the sulphur vein. The coal has an excellent clay underlying it which adds great commercial importance to that horizon. The coal can be mined profitably in most localities only in conjunction with the clay.

On Raccoon Creek in Raccoon township the bed ranges from 2 feet to 3 feet 2 inches thick. It contains rather thick and numerous bone partings. At Phillis Island, Greene township, the coal is 2 feet 7 inches thick, including a 2-inch shale parting 6 inches above the bottom. In Moon township the bed is rarely of minable thickness and usually contains numerous bone and shale partings.

East of Ohio and Beaver rivers the Lower Kittanning ranges from 12 inches to 2 feet 6 inches thick and is usually clean.

In the vicinity of Beaver Falls the coal averages 2 feet 6 inches thick, and is usually clean with the exception of a local parting 1 inch thick near the top. This characteristic is present in all of the townships bordering Beaver River on the west.

In South Beaver township the coal has its maximum thickness of 3 feet 4 inches and is locally entirely clean.

The Lower Kittanning is thin in Darlington township.

There are only half a dozen mines in Beaver County working the Lower Kittanning for commercial shipments.

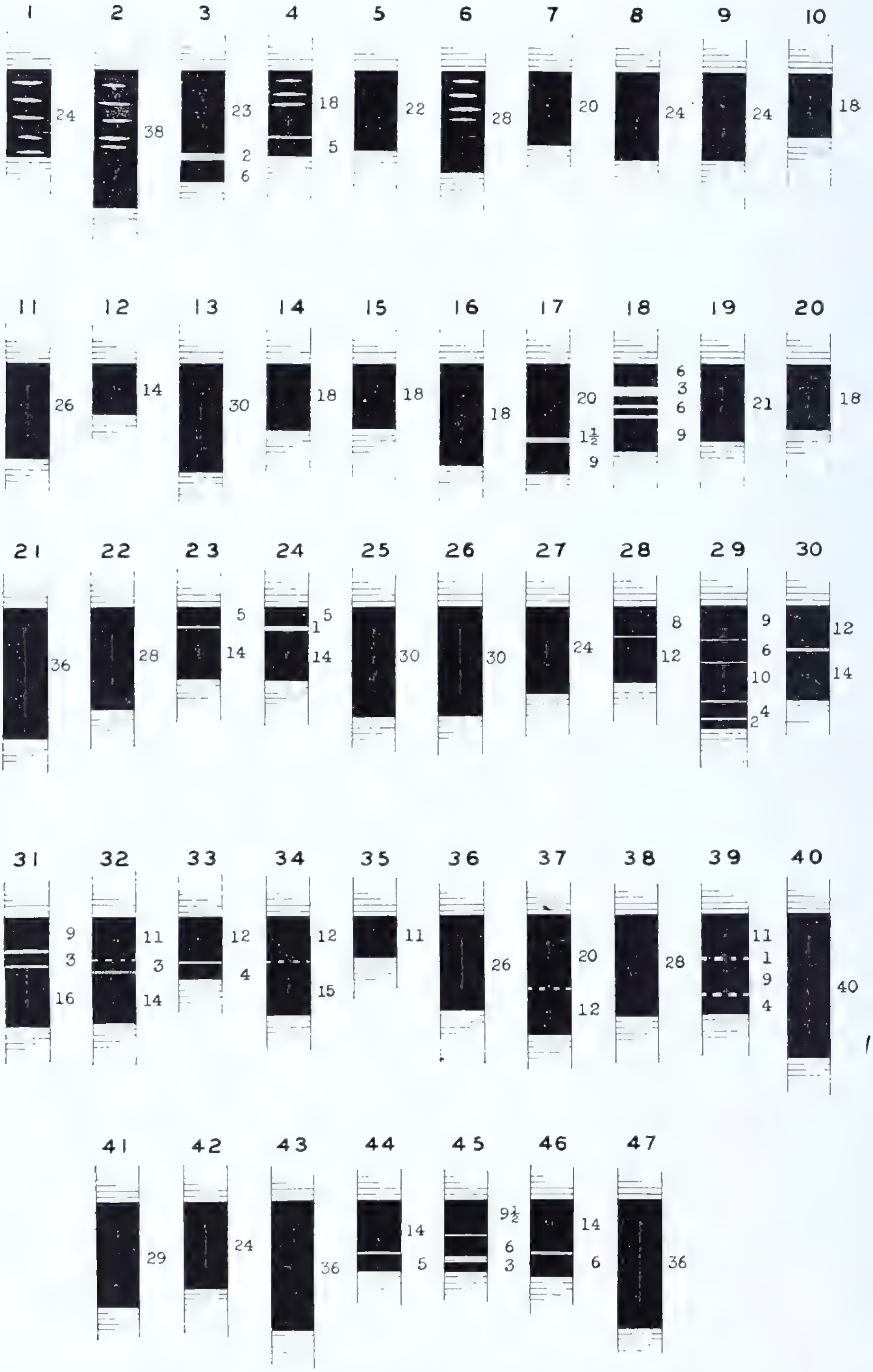


Figure 19. Sections of Lower Kittanning coal in Beaver County.

1. Outcrop on Raccoon Creek, 2 miles northeast of Holt, Raccoon township.
2. Outcrop on Raccoon Creek at mouth of Fishpot Run, Raccoon township.
3. Outcrop on south bank of Ohio River at Phillis Island, Greene township.
4. Outcrop on Poorhouse Run, 1 mile southeast of Dam No. 6, Moon township.
5. Outcrop at Monaca, Moon township.
6. Outcrop on south bank of Ohio River, at north end of Monaca, Moon township.
7. Outcrop on south bank of Ohio River, 1½ miles west of Monaca, Moon township.
8. Outcrop at Beaver Falls, in Beaver Falls boro.
9. Outcrop on west bank of Beaver River at Patterson Heights.
10. Mine, on Brady Run ½ mile northwest of Fallston, Brighton township.
11. Mine, on Brady Run ¾ mile northwest of Fallston, Chippewa township.
12. Outcrop on south bank of Brady Run, 3 miles southwest of Beaver Falls, Brighton township.
13. Outcrop on North Branch of Brady Run, 1 mile southwest of Beaver Falls, Chippewa township.
14. Outcrop on North Branch of Brady Run, 2¼ miles west of Beaver Falls, Chippewa township.
15. Outcrop on north bank of Ohio River at Vanport, Brighton township.
16. Mine, on north bank of Ohio River, 1 mile southwest of Vanport.
17. Outcrop at mouth of Fourmile Run, ¼ mile west of Dam No. 6, Brighton township.
18. Outcrop on north bank of Ohio River, ½ mile west of Industry.
19. Outcrop on Blockhouse Run, 1 mile southeast of Beaver Falls, Daugherty township.
20. Outcrop on Blockhouse Run, 1½ miles east of Beaver Falls, Daugherty township.
21. Outcrop, east of Beaver Falls, Daugherty township.
22. Outcrop, east of Beaver Falls, Daugherty township.
23. Outcrop at Eastvale, Daugherty township.
24. Outcrop on Thompson Run, North Sewickley township.
25. Outcrop 2 miles west of Beaver Falls, Chippewa township.
26. Outcrop, 1 mile west of Beaver Falls, Chippewa township.
27. Outcrop in Beaver Falls boro.
28. Outcrop in western part of Beaver Falls boro.
29. Mine, in Beaver Falls boro.
30. Outcrop at College Hill, White township.
31. Outcrop, ¾ mile south of Morado, White township.
32. Mine, 1¼ miles southwest of Morado, Chippewa township.
33. Outcrop 1½ miles west of Beaver Falls, Chippewa township.
34. Outcrop, 1¾ miles southwest of Cannelton, South Beaver township.
35. Outcrop on Wallace Run, 1 mile northwest of Morado, Big Beaver township.
36. Outcrop, 1 mile southeast of Darlington, Big Beaver township.
37. Outcrop 1½ miles southeast of Darlington, South Beaver township.
38. Outcrop in road 1 mile south of Darlington, South Beaver township.
39. Outcrop, ¾ mile southwest of Darlington, South Beaver township.
40. Outcrop, 1 mile southeast of Cannelton, South Beaver township.
41. Outcrop 1 mile northeast of Darlington, Big Beaver township.
42. Outcrop, ½ mile south of Homewood, Big Beaver township.
43. Outcrop on Stockmans Run, 1 mile southwest of West Ellwood Junction.
44. Outcrop ¾ mile southeast of New Galilee, Big Beaver township.
45. Outcrop, ¾ mile west of New Galilee, Darlington township.
46. Outcrop, at Darlington, Darlington township.
47. Outcrop on Dillworth Run, ¾ mile northwest of its mouth, Darlington township.

MIDDLE KITTANNING (C) COAL.

The Middle Kittanning, lying approximately 35 feet above the Lower Kittanning, is persistent in its occurrence but is exceedingly variable in thickness. It is not being worked on a commercial scale in Beaver County.

In Greene township the Middle Kittanning ranges from 12 inches to 2 feet 6 inches thick. It is characteristically clean. In Moon township it is thin, averaging less than 12 inches. In Daugherty township it averages 14 inches. In the vicinity of Beaver Falls, and in Brighton township it is extremely thin and locally absent.

In Industry township it averages 15 inches thick. In Daugherty township 13 inches. In North Sewickley township it varies much in thickness and physical character. Usually it is a bed of clean coal 2 feet 3 inches thick. Where its thickness increases, a bone parting from 1 to 3 inches thick is present, 15 inches below the top. The bottom bench ranges from 16 inches to 1 foot 10 inches thick. An exception to this rule is in the vicinity of McKimm. At this locality the bed averages 2 feet 6 inches thick and contains a shale parting 1 inch thick, 4 to 6 inches above the bottom.

In Big Beaver township the coal is locally of minable thickness, averaging possibly 2 feet 6 inches thick. It seldom occurs as a single bench, but is divided by two or more shale and bone partings. The possible future value of the Middle Kittanning is most uncertain.

The following sections illustrate the occurrence of the Middle Kittanning in Beaver County:

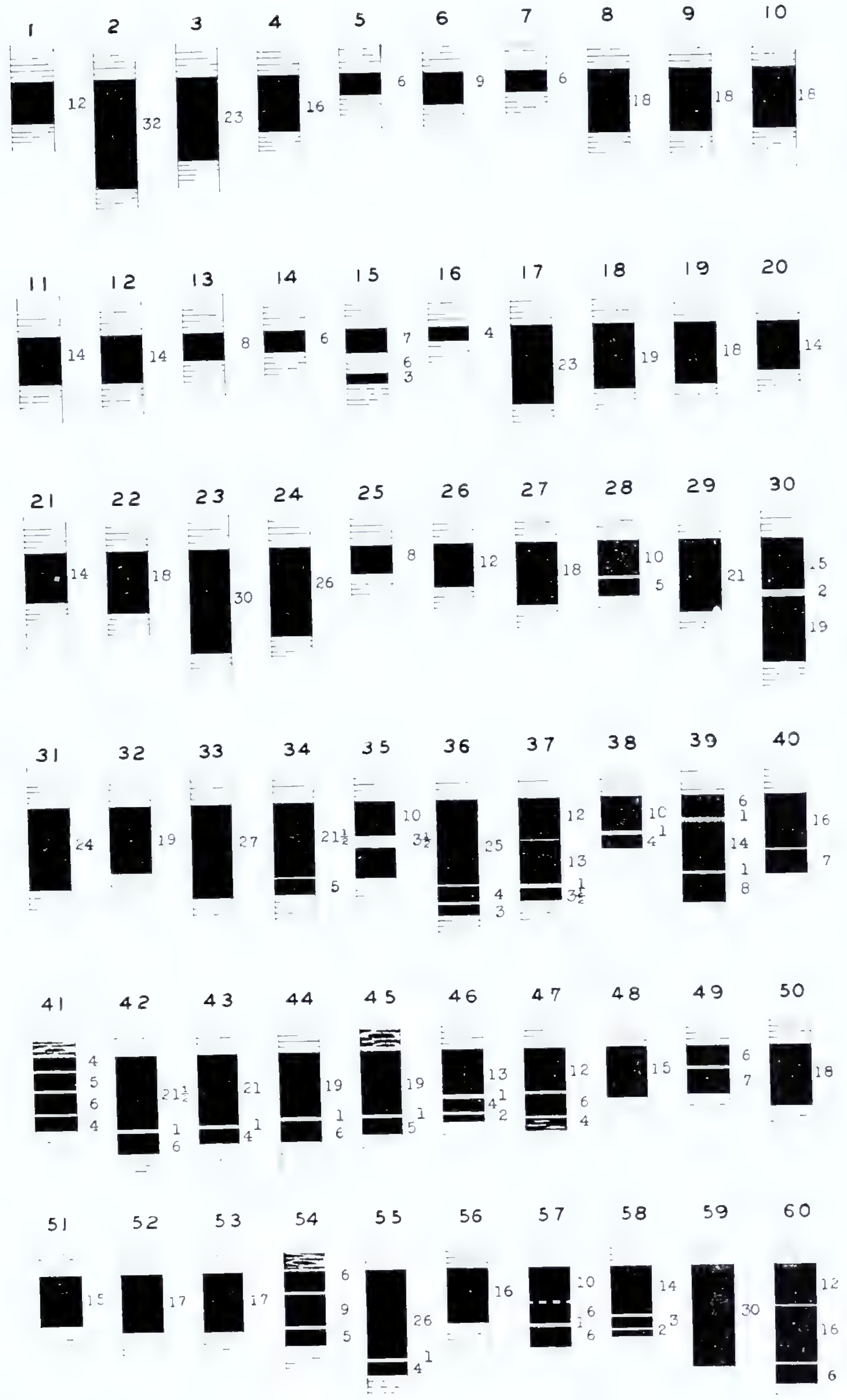


Figure 20. Sections of Middle Kittanning coal in Beaver County.

1. Outcrop south bank of Ohio River, at Phillis Island, Greene township.
2. Outcrop mouth of Mill Creek near Georgetown, Greene township.
3. Outcrop on Mill Creek, 1 mile south of Georgetown, Greene township.
4. Outcrop at mouth of Moon Run, Moon township.
5. Outcrop on Moon Run, ¾ mile west of Bakers Landing, Moon township.
6. Outcrop on south bank of Ohio River at Monaca, Moon township.
7. Outcrop at Bolesville, Rochester boro.
8. Outcrop on Raccoon Creek, 1 mile south of Dam No. 6, Moon township.
9. Outcrop on Ohio River south of St. Clair.
10. Outcrop on east bank of Beaver River, ½ mile northeast of Beaver Falls, Daugherty township.
11. Outcrop on Blockhouse Run, 1 mile north of New Brighton, Daugherty township.
12. Outcrop at western boundary of Beaver Falls boro.
13. Outcrop in Beaver boro.
14. Outcrop on Brady Run, 1 mile west of Fallston, Brighton township.
15. Outcrop on North Branch of Brady Run, 3½ miles west of Beaver Falls, Chippewa township.
16. Outcrop on north bank of Ohio River, 1 mile southwest of Vanport, Brighton township.
17. Outcrop on north bank of Ohio River at Dam No. 6, Brighton township.
18. Outcrop at mouth of Fourmile Run, on north bank of Ohio River, Brighton township.
19. Outcrop on Sixmile Run, 1¼ miles northeast of Industry, Industry township.
20. Prospect at Cooks Ferry, north bank of Ohio River, Industry, Industry township
21. Outcrop on north bank of Ohio River, at Smiths Ferry, Ohio township.
22. Outcrop on Dry Run, ½ mile northwest of Smiths Ferry.
23. Outcrop on Little Beaver Creek, Ohio township.
24. Outcrop on Island Run, ½ mile northwest of Ohioville, Ohio township.
25. Outcrop opposite Beaver Falls, Daugherty township.
26. Outcrop ½ mile southeast of Eastvale, Daugherty township.
27. Outcrop at Eastvale, North Sewickley township.
28. Outcrop ½ mile northeast of Eastvale, North Sewickley township.
29. Outcrop ½ mile north of Eastvale, North Sewickley township.
30. Outcrop on Bennetts Run ¾ mile east of its mouth, North Sewickley township.
31. Outcrop on North Branch of Bennetts Run, 1¼ miles southwest of Thompson Run mines, North Sewickley township.
32. Outcrop on county road, 2 miles east-southeast of Thompson Run mines, North Sewickley township.
33. Outcrop ¾ mile south of Thompson Run mines, North Sewickley township.
34. Outcrop on county road, 1¾ miles east of Morado, North Sewickley township.
35. Outcrop on hilltop, 1 mile east of Morado, North Sewickley township.
36. Outcrop in hilltop, 1 mile west-southwest of Thompson Run mines, North Sewickley township.
37. Outcrop ¾ mile northeast of Thompson, North Sewickley township.
38. Outcrop on Thompson Run, ½ mile southeast of Thompson, North Sewickley township.
39. Outcrop 2 miles east-northeast of Thompson Run mines, North Sewickley township.
40. Outcrop 1½ miles southwest of McKimm, North Sewickley township.
41. Outcrop 1 mile southwest of McKimm, North Sewickley township.
42. Outcrop 1 mile west of McKimm, North Sewickley township.
43. Outcrop ¼ mile east of Bellton, North Sewickley township.
44. Outcrop ¾ mile northeast of McKimm, Franklin township.
45. Outcrop ½ mile west-northwest of Frisco (Ellwood South), North Sewickley township.
46. Outcrop 1 mile south of Ellwood City, North Sewickley township.
47. Outcrop ¾ mile southeast of Rock Point, North Sewickley township.
48. Outcrop in northwestern part of Beaver Falls boro.
49. Outcrop ¼ mile northwest of College Hill, White township.
50. Outcrop 1 mile northwest of College Hill, White township.
51. Outcrop ¼ mile south of Morado, White township.
52. Outcrop ½ mile northwest of Morado, Big Beaver township.
53. Outcrop north of Wallace Run, 1¼ miles northwest of Morado, Big Beaver township.
54. Outcrop ½ mile south of Homewood, Big Beaver township.
55. Outcrop north of Wallace Run, 2 miles southwest of Homewood, Big Beaver township.
56. Outcrop 1 mile southwest of Darlington, Big Beaver township.
57. Outcrop on Clarks Run, 1¼ miles west-northwest of Homewood, Big Beaver township.
58. Outcrop on Clarks Run, 1 mile west of Homewood, Big Beaver township.
59. Outcrop on Stockman Run, 1½ miles northwest of Homewood, Big Beaver township.
60. Outcrop ¾ mile south of Hoytdale, Big Beaver township.

UPPER KITTANNING (C′) COAL.

The Upper Kittanning bed is thin and unimportant in the county, seldom being over 6 to 8 inches thick. On Brush Run, however, a coal, possibly the Upper Kittanning, has been mined locally and is reported to be 4 feet thick, including 6 to 12 inches of parting.

The Upper Kittanning in Beaver County is locally cannel coal. At Cannelton the bed is almost entirely cannel coal, having a maximum thickness of 13 feet, and averaging 7 to 8 feet. It fills a race track-like trough about 300 feet wide, extending around an oval 2 miles long by 1 mile wide. Bituminous coal is 12 inches thick in the center of this basin, but thins to 4 inches at the edge.

An unusual thickness of the Upper Kittanning is at Blackhawk in South Beaver township. In this vicinity the bed ranges from 3 feet to 4 feet 4 inches thick and is entirely clean. In a mine on Coalbank Run northwest of Cannelton, Darlington township, the coal averages 5 feet 6 inches thick, including a bone parting 2 feet 6 inches below the top.

The outcrop indications in the remainder of the townships of Beaver County are very unpromising. The following sections illustrate the extreme variability of this bed.

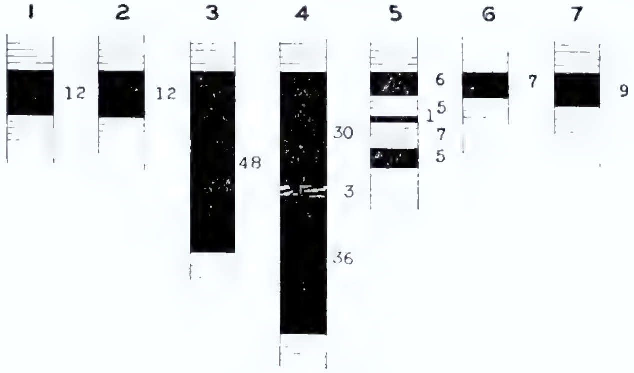


Figure 21. Sections of Upper Kittanning coal in Beaver County.

1. Outcrop on Blockhouse Run, 1 mile east of Beaver Falls, Daugherty township.
2. Outcrop on Brady Run, $\frac{1}{2}$ mile south of Patterson Heights, Patterson township.
3. Outcrop on Brush Run, $2\frac{1}{2}$ miles north of Blackhawk, South Beaver township.
4. Beaver Cannel Coal Co. Beaver Cannel mine, on Coal Bank Run, $1\frac{1}{4}$ mile northwest of Cannelton, Darlington township.
5. Outcrop on east bank of Beaver River, $1\frac{1}{2}$ miles southeast of Eastvale, Daugherty township.
6. Outcrop at Eastvale, Daugherty township.
7. Outcrop $\frac{1}{4}$ mile south of Homewood, Big Beaver township.

LOWER FREEPORT (D) COAL.

The Lower Freeport, lying about 60 feet below the Upper Freeport, is thin in Beaver County, averaging 15 inches. Although it is locally much thicker, it is also lacking in many localities. It is bony and impure at many localities where its thickness has been measured. Only the thickest occurrences of this bed will be discussed here. Other measurements are contained in Figure 22.

On the south bank of Ohio River two miles southeast of Georgetown, Greene township, the coal locally averages 3 feet thick and is entirely clean. Three miles northwest of Blackhawk in South Beaver township, the same thickness is prevalent, while at Patterson Heights in Patterson township the coal averages 2 feet 7 inches thick, and is entirely clean.

On Trough Run, opposite Beaver Falls, the bed is an impure cannel coal 4 feet thick. On Blockhouse, McKinley, Brady, and Twomile runs, Raccoon Creek, Island Run, and Brush Run the coal is good and regular in thickness, ranging from 12 inches to 2½ feet.

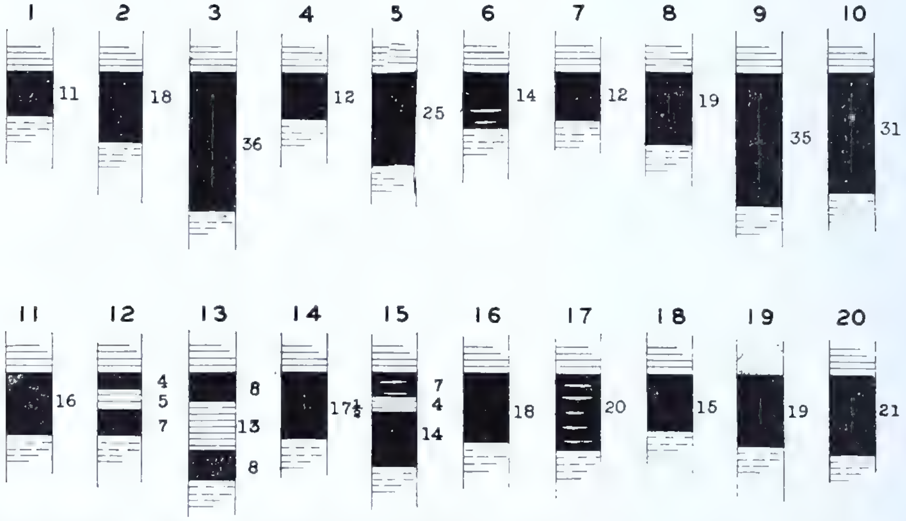


Figure 22. Sections of Lower Freeport coal in Beaver County.

1. Outcrop on Raccoon Creek, 3 miles west of Sheffield, Raccoon township.
2. Outcrop on Fishpot Run, ¾ mile southwest of its mouth, Raccoon township.
3. Outcrop on south bank of Ohio River, 2 miles southeast of Georgetown, Greene township.
4. Outcrop on Ohio River, ½ mile west of Hog Island, Moon township.
5. Outcrop on Moon Run, 1½ miles southwest of Bakers Landing, Moon township.
6. Outcrop at Monaca, Moon township.
7. Outcrop on Dry Run, 1¼ miles north of Smiths Ferry, Ohio township.
8. Outcrop on Island Run, ¼ mile northwest of Ohioville, Ohio township.
9. Outcrop on Brush Run, 2½ miles north-northwest of Blackhawk, South Beaver township.
10. Outcrop, 3 miles northwest of Blackhawk, South Beaver township.
11. Outcrop, ½ mile southeast of Patterson Heights, Patterson township.
12. Outcrop on Bradys Run, 1½ miles south of Patterson Heights, Brighton township.
13. Outcrop on Twomile Run, 1 mile northwest of Beaver, Brighton township.
14. Outcrop on Twomile Run, 2 miles northwest of Beaver, Brighton township.
15. Outcrop on east bank of Ohio River at Freedom.
16. Outcrop on McKinley Run, 1 mile north of Rochester, Rochester boro.
17. Outcrop on Blockhouse Run, 1 mile east of Beaver Falls, Daugherty township.
18. Outcrop on Blockhouse Run, 1½ miles northeast of New Brighton, Brighton township.
19. Outcrop on east bank of Ohio River, ¾ mile southeast of Eastvale, Daugherty township.
20. Outcrop on Rush Run, 2½ miles south of Cannelton, South Beaver township.

UPPER FREEPORT (E) COAL.

The Upper Freeport bed is the most important Allegheny coal in the county, although it is more irregular and lenticular here than in adjoining counties. It is persistent, and ranges from 6 inches to 5 feet thick. Where thickest it has 6 to 8 inches of impure, shaly top coal, and the main bench of good coal is 2 feet 5 inches to 3 feet thick. In the northern part of the county it is 4 to 5 feet thick where not removed by erosion. The Upper Freeport coal has been mined extensively in the western part of the county and shipped as a gas coal. It has a persistent thickness of 4 feet 6 inches, and is divided into four benches by thin shale partings. The bottom and top benches are impure and worthless. The main bench is good coal, averaging 3 feet thick. The areas of this thick coal in this vicinity are small, and the coal is high in sulphur. The thickness diminishes northward, but the coal is purer. In the region east of the Beaver and north of the Ohio, the bed is thin, averaging about 17 inches thick, and is separated by many partings.

South of Ohio River and east of Raccoon Creek the coal locally is fairly thick but is much parted with bone and shale. Near the mouths of Logtown, Elkhorn, and Moon runs the coal is thin, but the bed has been opened at many places for domestic fuel on their headwaters, and averages 2 feet 2 inches thick.

The Upper Freeport coal is lenticular south of Ohio River and west of Raccoon Creek, ranging from 16 inches to nearly 7 feet thick. It carries several bone partings, but the benches are thicker than in the region north, and tend to overcome this disadvantage. On Squirrel, Fishpot, and Island runs, and Service Creek the coal is separated by partings thick enough to make it a split bed. On Raccoon Creek the coal is thin, but clean and excellent. Its average thickness is 2 feet, but locally it reaches a maximum of 3 feet.

The greatest thickness of the Upper Freeport is on Jordan Run 1½ miles northeast of New Galilee, Big Beaver township. Here the bed averages 7 feet 6 inches thick and is entirely clean.

The Upper Freeport appears to be persistently 4 feet 6 inches thick at Thompson Run Mines, North Sewickley township. The coal is of good quality and the local partings are easily separated. In Chippewa township, in the vicinity of Darlington, the Upper Freeport ranges from 3 feet 4 inches to 5 feet 6 inches thick. Locally it is entirely clean, but usually contains one or two bone partings ½ inch to 2 inches thick.

In Greene, South Beaver, and Ohio townships the coal seems to be persistent in a thickness of 3 feet 4 inches. For many square miles there are no persistent partings. At the present time production from this bed in this area is limited to custom coal banks. Undoubtedly this coal will be opened in the future for commercial use.

The following sections illustrate the desirability of this bed:

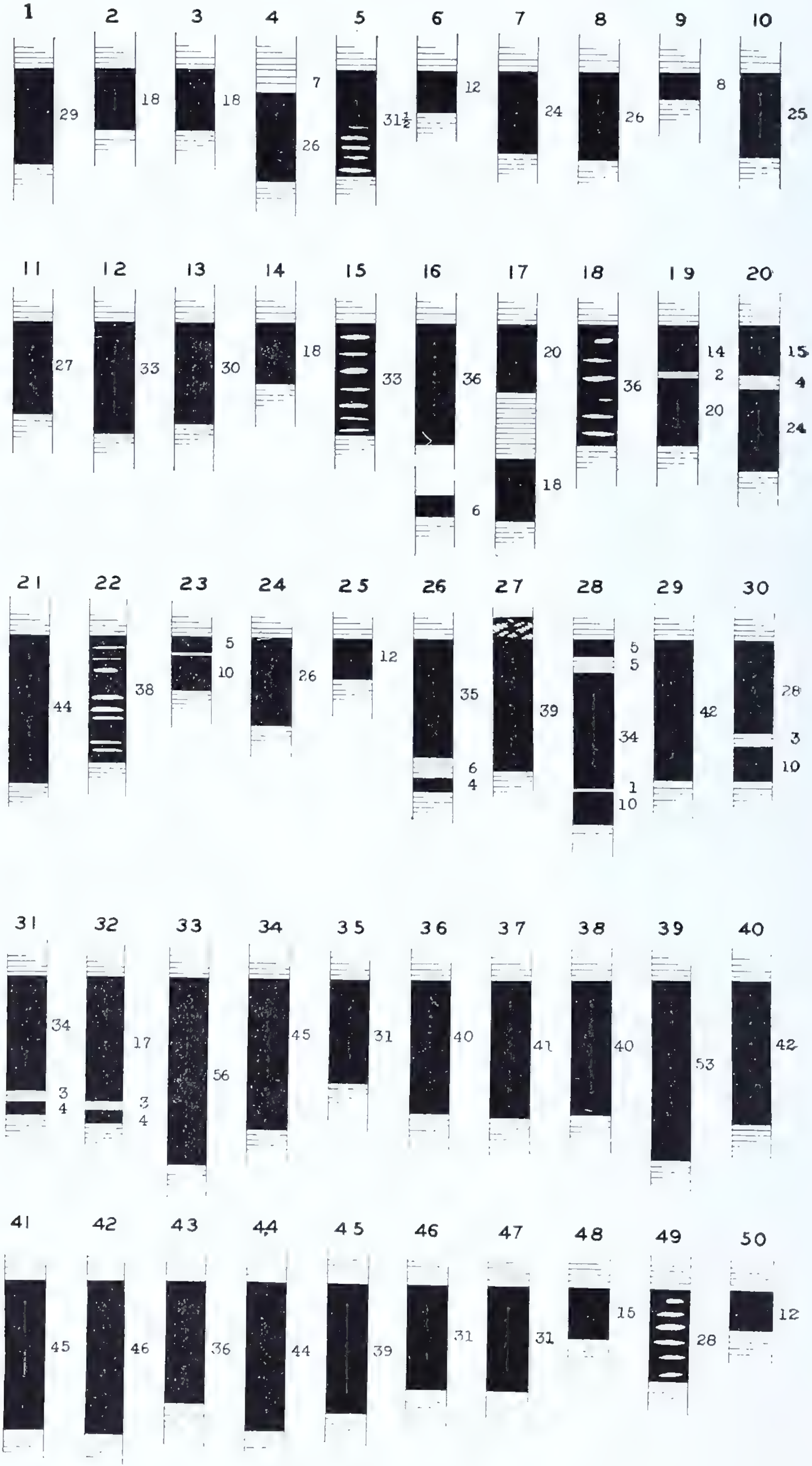


Figure 23. Sections of Upper Freeport coal in Beaver County.

1. Mine, on Logtown Run, 1½ miles east of New Sheffield, Hopewell township.
2. Outcrop on Logtown Run, 1¼ miles east of New Sheffield, Hopewell township.
3. Outcrop ½ mile southwest of Hog Island, Moon township.
4. Outcrop on south branch of Moon Run, 1¼ miles west of Stobo, Moon township.
5. Outcrop on south bank of Ohio River, 1 mile southwest of Monaca, Moon township.
6. Outcrop on Poorhouse Run, 1¼ miles south-southeast of Dam No. 6, Moon township.
7. Outcrop on Raccoon Creek, 1 mile west of Shafers, Moon township.
8. Outcrop on Raccoon Creek, 1½ miles north-northwest of Sheffield, Moon township.
9. Outcrop on Raccoon Creek, ¾ mile north of Independence, Independence township.
10. Outcrop on Raccoon Creek, 1 mile southwest of Sheffield, Hopewell township.
11. Outcrop on Raccoon Creek, 1¼ miles west of Sheffield, Hopewell township.
12. Outcrop on Raccoon Creek, 1½ miles southwest of Bunker Hill, Raccoon township.
13. Outcrop on Raccoon Creek, 1¼ miles southeast of Holt, Raccoon township.
14. Outcrop on Ohio River, 1 mile east of mouth of Squirrel Run, Raccoon township.
15. Outcrop on Fishpot Run, ¾ mile north of Holt, Raccoon township.
16. Outcrop on Fishpot Run, 1 mile northeast of Holt, Raccoon township.
17. Outcrop on Squirrel Run, opposite Montgomery Island, Raccoon township.
18. Outcrop on headwaters of Squirrel Run, Raccoon township.
19. Outcrop ½ mile west of mouth of Squirrel Run, Raccoon township.
20. Outcrop on Haden Run, 1¼ miles east-southeast of Shippingport, Raccoon township.
21. Outcrop on east branch of Peggs Run, 1 mile southeast of Phillis Island, Greene township.
22. Outcrop on east branch of Peggs Run, 1¼ miles west of McCleary, Greene township.
23. Outcrop on west branch of Peggs Run, 1 mile south of Phillis Island, Greene township.
24. Outcrop on Service Creek, 1½ miles northeast of Mechanicsburg, Raccoon township.
25. Outcrop on Service Creek, 2 miles northeast of Mechanicsburg, Raccoon township.
26. Outcrop on east branch of Peggs Run, 1 mile west of McCleary, Greene township.
27. Outcrop on west branch of Peggs Run, 2 miles west of McCleary, Greene township.
28. Outcrop of west branch of Peggs Run, 1¾ miles northeast of Hookstown, Greene township.
29. Outcrop on south bank of Ohio River opposite Phillis Island, Greene township.
30. Outcrop on south bank of Ohio River, 1¼ miles southeast of Georgetown, Greene township.
31. Outcrop on Mill Creek, 2 miles south of Georgetown, Greene township.
32. Outcrop on Mill Creek, 1 mile northwest of Hookstown, Greene township.
33. Outcrop on Brush Creek, 2½ miles north of Blackhawk township, South Beaver township.
34. Outcrop, 2½ miles northwest of Blackhawk, South Beaver township.
35. Outcrop, 2¾ miles north-northwest of Blackhawk, South Beaver township.
36. Outcrop 3 miles northwest of Blackhawk, South Beaver township.
37. Outcrop, 3¼ miles northwest of Blackhawk, South Beaver township
38. Outcrop on Bieler Run, 1¼ miles north of Ohioville, Ohio township.
39. Outcrop on Bieler Run, 1 mile northwest of Esther, Ohio township.
40. Outcrop on Island Run, ¼ mile west of Ohioville, Ohio township.
41. Outcrop on Island Run, ½ mile northwest of Ohioville, Ohio township.
42. Outcrop on Island Run, ½ mile southwest of Ohioville, Ohio township.
43. Outcrop on Wolf Run, 1¼ miles northwest of Industry, Industry township.
44. Outcrop, 1¼ miles north of Industry, on Sixmile Run, Industry township.
45. Outcrop on Sixmile Run, 2 miles northeast of Industry, Industry township.
46. Outcrop on east branch of Sixmile Run, 1½ miles northwest of Merrill, Industry township.
47. Outcrop on Sixmile Run, 3 miles northwest of Merrill, Brighton township.
48. Outcrop on Twomile Run, 1 mile northwest of Beaver, Brighton township.
49. Outcrop, halfway between Vanport and Beaver, Beaver Boro.
50. Outcrop, 1 mile northwest of Vanport.
51. Outcrop on north bank of Ohio River, ¼ mile north of Dam No. 6, Brighton township.
52. Outcrop at Beaver Terrace, Brighton township.
53. Outcrop on Brady Run, ¼ mile northwest of Fallston, Patterson Boro.
54. Outcrop on Brady Run, 1¼ miles west northwest of Fallston, Brighton township.
55. Outcrop on headwaters of south branch of Brady Run, 2 miles northeast of Blackhawk, South Beaver township.

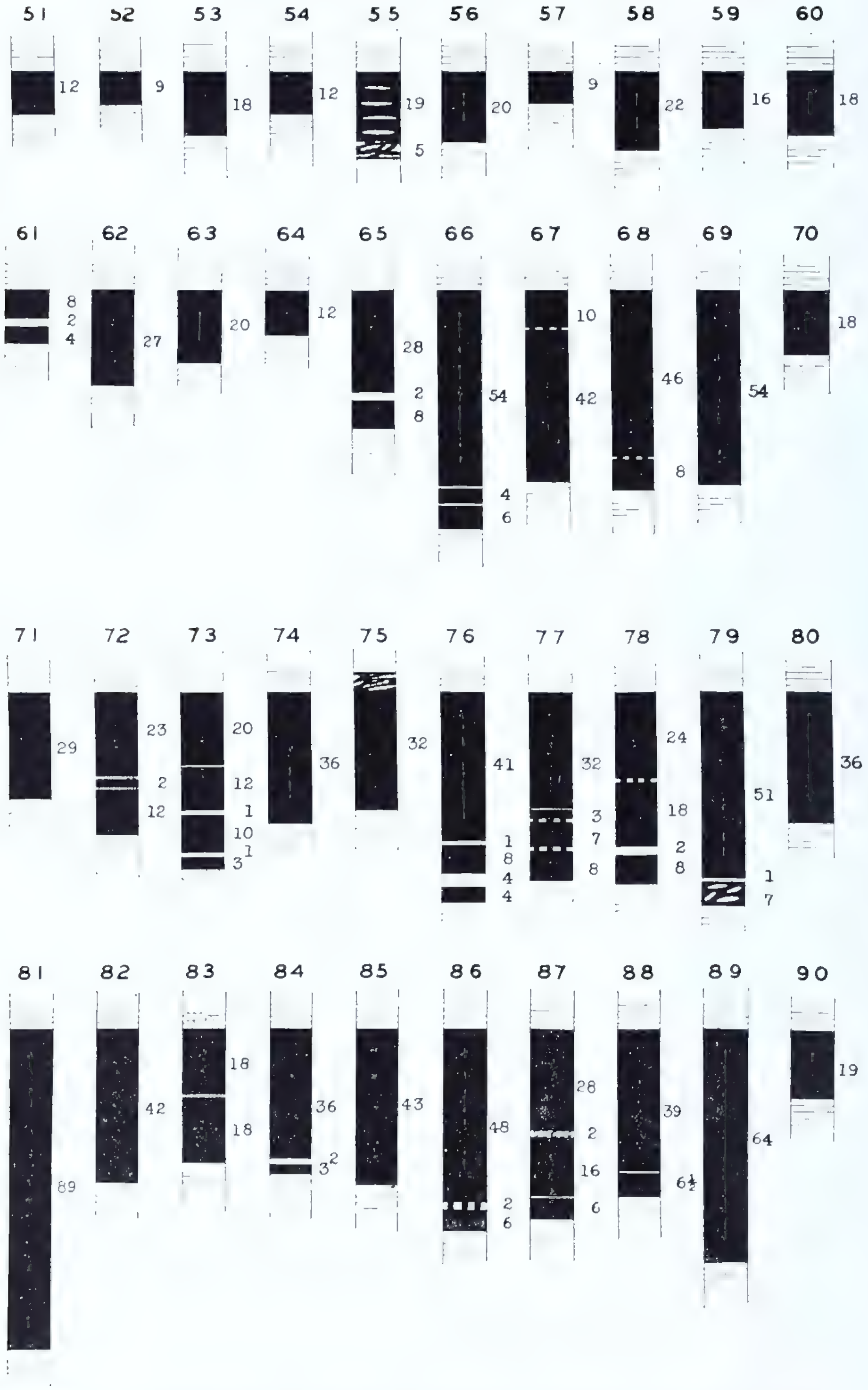


Figure 24. Sections of Upper Freeport coal in Beaver County.

56. Outcrop, 1 mile east of Rochester, Daugherty township.
57. Outcrop, 1½ miles east of Rochester, Daugherty township.
58. Outcrop, ½ mile northeast of Rochester, Rochester Boro.
59. Outcrop on Blockhouse Run, at New Brighton, Pulaski township.
60. Outcrop on Blockhouse Run, 2½ miles east of Beaver Falls, Daugherty township.
61. Outcrop on Blockhouse Run, 1½ miles north-northeast of New Brighton, Daugherty township.
62. Outcrop, ½ mile southeast of Eastvale, Daugherty township.
63. Outcrop, 3 miles northeast of Eastvale, North Sewickley township.
64. Outcrop, 2½ miles southeast of Thompson Run mines, North Sewickley township.
65. Outcrop, 2 miles south-southeast of Thompson Run mines, North Sewickley township.
66. Outcrop at Thompson Run mines, North Sewickley township.
67. Baker Coal Company. Thompson Run mine, at Thompson Run Mines, North Sewickley township.
68. Country bank, 1 mile east of Thompson Run Mines, North Sewickley township.
69. Outcrop on Brush Run, 3 miles south of Cannelton, South Beaver township.
70. Outcrop on country road in northwest Patterson Borough.
71. Outcrop on country road, 2 miles west of College Hill, Chippewa township.
72. Outcrop on south branch of Wallace Run, 2½ miles southwest of Morado, Chippewa township.
73. Outcrop on headwaters of south branch of Wallace Run, 3 miles southwest of Morado, Chippewa township.
74. Outcrop south of Painters Run, 1½ miles south-southeast of Cannelton, South Beaver township.
75. Outcrop, 1¼ miles south-southwest of Cannelton, South Beaver township.
76. Country bank, 1¼ miles south of Cannelton, South Beaver township.
77. Country bank, 1¾ miles southeast of Darlington, Chippewa township.
78. Francis Coal & Clay Company. Francis mine, 1½ miles southeast of Darlington, Chippewa township.
79. Country bank, 2 miles southeast of Darlington, Chippewa township.
80. Outcrop, 1 mile southeast of New Galilee, Big Beaver township.
81. Outcrop on Jordan Run, 1½ miles northeast of New Galilee, Big Beaver township.
82. Beaver Northside Coal Company. Northside mine, on State line, 1 mile north of Negley, Ohio, Darlington township.
83. Harry R. Beegle. Redhill No. 1 mine, on Coalbank Run, 2 miles northwest of Cannelton, Darlington township.
84. Mine, on Coalbank Run, 1½ mile northwest of Cannelton, Darlington township.
85. Mine, at Cannelton, Darlington township.
86. Outcrop on Dilworth Run, 1½ miles northwest of Darlington, Darlington township.
87. Country bank, on Dilworth Run, 1 mile northeast of Cannelton.
88. Outcrop on Dilworth Run, 1¼ miles north of Cannelton, Darlington township.
89. Outcrop on Dilworth Run, 1¼ miles north of Cannelton, Darlington township.
90. Outcrop, 1 mile south of Enon Valley, Darlington township.

East Palestine Coal.

The East Palestine coal, lying approximately 70 feet above the Upper Freeport, is mined only for house fuel, with the exception of one locality 3½ miles northwest of Cannelton, Darlington township. In most localities this bed is not more than 1 foot 8 inches thick, and averages much less. In general it is represented by a few feet of bituminous shale. Its chief commercial value is in Darlington township.

The following sections illustrate the desirability of this bed:

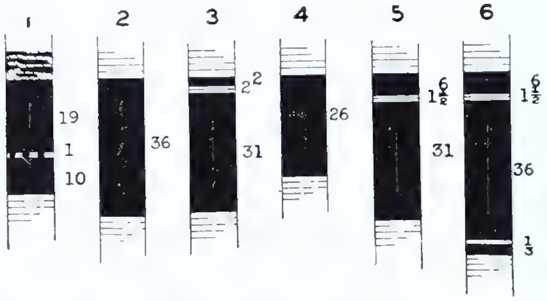


Figure 25. Sections of East Palestine coal in Beaver County.

1. Outcrop, 2 miles northwest of Darlington, Darlington township.
2. Outcrop on Dilworth Run, 1½ miles north of Cannelton, Darlington township.
3. Outcrop on Coalbank Run, 3 miles northwest of Cannelton, Darlington township.
4. National Fireproofing Co. mine on Coalbank Run, 3½ miles northwest of Cannelton, Darlington township.
5. Outcrop on Dilworth Run, 2 miles northwest of Cannelton, Darlington township.
6. Outcrop, north of McCautry Run, 2½ miles northwest of Darlington, Darlington township.

PITTSBURGH COAL.

A few hilltops in the southeastern part of the county contain the Pittsburgh bed, and it has been opened up in all of them. The coal is under thin cover, has been leached and weathered, and does not have its usual good quality. It is 5 to 6 feet thick and is divided into four distinct benches by shale partings.

CHAPTER IV.

BLAIR COUNTY.

INTRODUCTION.

The coal-bearing rocks are confined to a small area on the crest of Allegheny Mountain in the western part of Blair County. These beds are the Brookville, Clarion, Lower, Middle and Upper Kittanning, Lower and Upper Freeport.

COALS.

Generalized section of coal beds in Blair County.

Coal bed	Average interval in feet	Average thickness	
		Ft.	in.
Upper Freeport		4	0
	65		
Lower Freeport		1	0
	45		
Upper Kittanning		1	0
	50		
Middle Kittanning		0	6
	35		
Lower Kittanning		3	6
	35		
Clarion		0	6
	27		
Brookville		4	0

BROOKVILLE (A) COAL.

The Brookville is mined only in Logan township, where it averages 3 feet 8 inches thick. It usually occurs in two benches separated by a 1-inch shale parting 11 inches below the top. The bottom bench averages 2 feet 8 inches thick. The physical character of the bed varies locally. East of Glenwhite, in Logan township, the coal occurs in three benches separated by two 4-inch shale partings. The top bench of coal is 2 feet 8 inches thick, the middle bench 12 inches, and the bottom bench 17 inches thick. At Bennington the Brookville is 27 feet below the Clarion, and 63 feet below the Lower Kittanning. The Brookville is generally very sulphurous and slaty.

CLARION (A′) COAL.

The Clarion coal is persistent and continuous in the coal-bearing rocks of Blair County. It is seldom more than 12 inches thick and is rarely of commercial importance. It is mined at two localities in Blair County. In the vicinity of Glenwhite, in Logan township, the coal is 3 feet thick, and contains no noticeable impurities other than "sulphur balls" and bone lenses.

At Buckhorn, in Gallitizin township, the coal is also 3 feet thick, and is entirely clean.

LOWER KITTANNING (B) COAL.

The Lower Kittanning is the chief commercial coal bed in Blair County. It has been used with much success for coking at Bennington. In Logan township the Lower Kittanning averages 2 feet 6 inches thick, and is fairly clean. It is mined commercially near Buckhorn and Glenwhite.

In Allegheny township the Lower Kittanning is 3 feet 3 inches thick, including a 2-inch shale parting 5 inches above the bottom. This section is representative of practically every locality in Allegheny township. The Lower Kittanning is mined at Blair Gap, 1¼ miles east of Summit. The bed averages 6 feet 4 inches thick, including a 12-inch sandstone parting 2 feet above the bottom.

MIDDLE KITTANNING (C) COAL.

The Middle Kittanning coal is thin in Blair County, and it is probably of workable thickness in restricted areas. At Bennington it is in two benches parted by 6 inches of shale. The upper bench is 6 inches thick, and the lower 18 inches.

LOWER FREEPORT (D) COAL.

The Lower Freeport is extremely thin in Blair County. One mine is working it ¾ of a mile southwest of Bennington. Here it is 2 feet 10 inches to 3 feet 3 inches thick, and is good clean coal. In all other localities in Blair County its commercial value is decreased by a great number of thin bone and pyrite partings and binders.

UPPER FREEPORT (E) COAL.

The Upper Freeport is the thickest and most persistent bed in Blair County. Its area is restricted to Allegheny township. It is mined commercially in the vicinity of Bennington and southeast of Gallitzin. It averages 4 feet 4 inches thick and occurs in two or three benches separated by shale partings ½ inch to 3 inches thick.

The Upper Freeport does not have coking qualities like the Lower Kittanning.

Tipton Run Coal Field.

An isolated area of coal, approximately 4 miles north of Tipton station in Antis township, was described by the Pennsylvania Second Geological Survey in 1885. These coal beds were referred to the Pocono group. More recent work has shown that these coals belong to the Allegheny group of the Pennsylvanian, and owe their presence to a fault. These beds have been mined to a small extent and the coal has been tested in the locomotives of the Pennsylvania Railroad and found to be of good quality. Their occurrence is much disturbed and mining is hazardous. The coal beds are five in number and occur in a vertical distance of approximately 110 feet. The coals average less than 3 feet thick and contain one to three bone partings ranging from ¼ inch to 6 inches thick. The occurrence of these beds is purely of geological interest, as their commercial value is extremely uncertain.

CHAPTER V.

BUTLER COUNTY.

INTRODUCTION.

Butler County's coal production has been increasing steadily for the last ten years. The county contains large areas of high volatile coals, just now coming into importance as the other high volatile coal fields of the State are rapidly being exhausted. Production has been delayed because the coals, as a rule, are high in ash and sulphur, and must be picked and washed to compete with the cleaner and thicker beds of other fields.

The Bessemer and Lake Erie Railroad crosses the county from southeast to northwest, and the Baltimore and Ohio Railroad from southwest to northeast, both through Butler. The Buffalo, Rochester, and Pittsburgh Railroad runs east, and the Pennsylvania Railroad southeast from Butler. The Western Allegheny Railroad crosses the county from east to west a few miles north of Butler.

Butler County has a network of dirt highways, and an intensive road building program is greatly increasing the mileage of improved roads. The highways are used for hauling coal to local consumers.

The topography is a dissected plateau. The highest hills are generally flat topped and range from 1200 feet above sea level in the southern part of the county to 1500 feet in the northern part. The valley bottoms are about 300 feet lower. As a rule the small streams flow in narrow valleys, but Connoquenessing Creek, the largest stream, meanders on its flood plain.

STRUCTURE

The geologic structure of Butler County is in general a monocline, with the rocks rising gently northward. This general rise is modified by several small structures which cross the county from northeast to southwest.

Boggsville syncline, in the southeast corner of the county, is a minor structure, with a broad flat bottom and an indefinite axis. The slopes on both flanks are gentle.

Kellersburg anticline, in Winfield township, is an important structure, with gentle slopes on both flanks, and an axis rising regularly northeast.

Bradys Bend syncline is next on the northwest, in Clearfield and Jefferson townships. It is a broad shallow basin, with an ill-defined axis rising gently northeast.

The northern tip of Mount Nebo syncline enters the southwest corner of the county on the headwaters of Kauffman Run, and extends northeast near Myoma. It is a well-defined structure with the dips on both flanks decreasing as the axis rises northeastward.

Brush Creek anticline enters the county just south of Hendersonville, and extends northeast near Callery. It is a broad flat fold, with its axis rising slowly to the north.

Sewickley syncline crosses the southern county line on Brush Creek; a mile north of that point the axis divides, one trough gradually curving northward to cross Brush Creek about half a mile east of Oakgrove Church. The other trough of this syncline has a northeast trend, and rises rapidly until it dies out against the side of Brush Creek anticline about a mile southwest of Callery.

Harrisville syncline in the northwestern corner of the county is a small fold having dips on both flanks, and an almost level axis.

STRATIGRAPHY.

The outcropping rocks of Butler County are the Conemaugh and Allegheny groups, and Pottsville series of Carboniferous age.

The Conemaugh group, composed of variegated shales, thin sandstones, limestones, and unimportant coal beds, has been eroded in the northern part of the county, and only a little over 100 feet remain in the southern part.

The Allegheny group, composed of massive sandstones, clays, limestones, shales, and important coal beds, underlies practically all the county, and has an extensive outcrop in the northern part. This group is about 325 feet thick.

The Pottsville series is composed chiefly of massive sandstones, shales, limestones, and impure coals. It has a limited outcrop in the largest stream valleys in the northern part of the county.

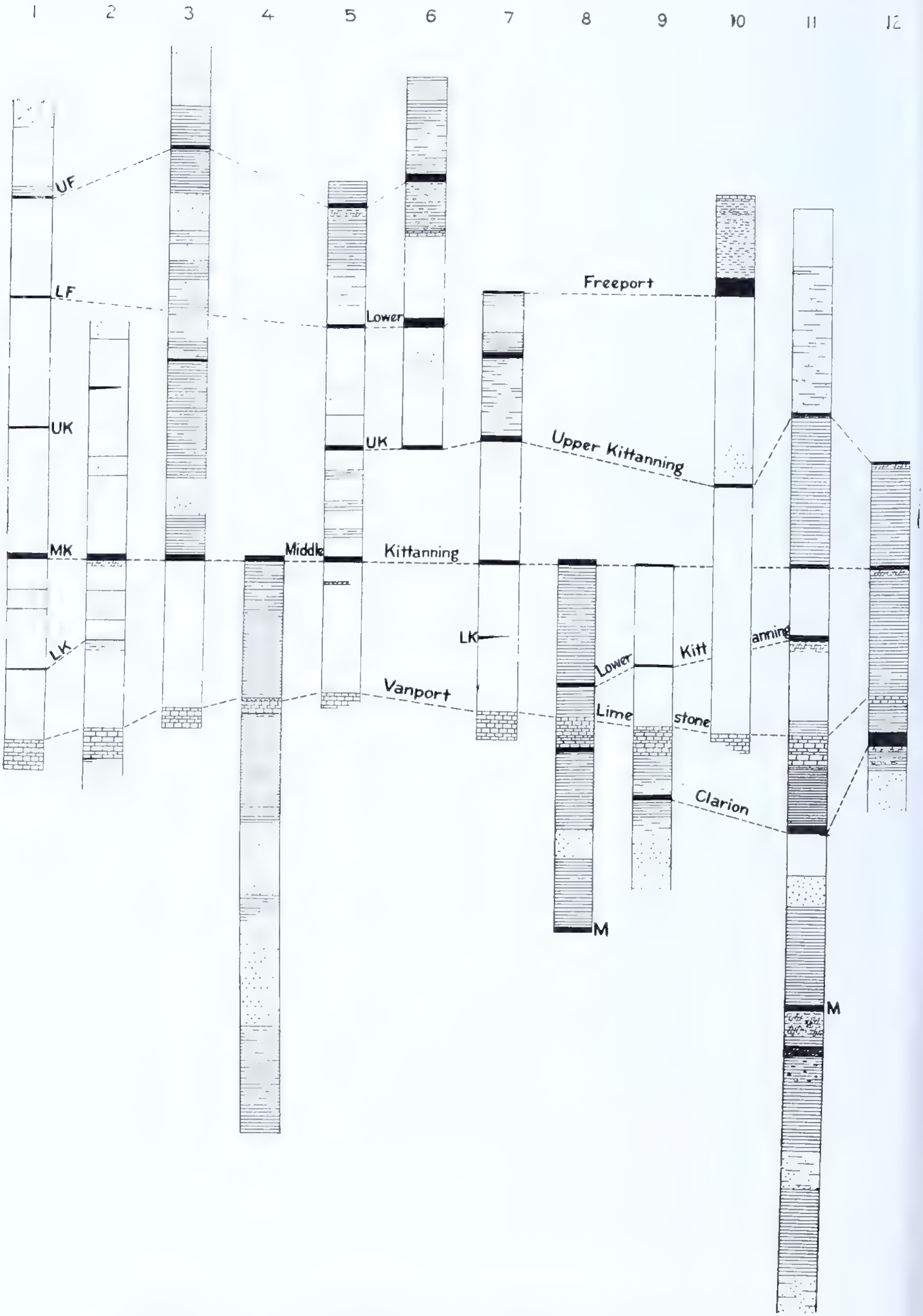


Figure 26. Stratigraphic sections, Butler County.

1. Allegheny group at Portersville, Muddy Creek Township. Pennsylvania Second Geological Survey, Rept. V, p. 60.
2. Allegheny group at Iron Bridge, Worth Township. Pennsylvania Second Geological Survey, Rept. V, p. 60.
3. Allegheny group, at Shaws Bridge on Muddy Creek. Pennsylvania Second Geological Survey, Rept. V, p. 64.
4. Allegheny and Pottsville at Seceder Bridge, Worth Township. Pennsylvania Second Geological Survey, Rept. V, p. 68.
5. Allegheny group, at Stone House, Brady Township. Pennsylvania Second Geological Survey, Rept. V, p. 74.
6. Allegheny group at Sunbury, Clay Township. Pennsylvania Second Geological Survey, Rept. V, p. 78.
7. Allegheny group on Big Bear Creek, Fairview Township. Pennsylvania Second Geological Survey, Rept. V, p. 88.
8. Allegheny and Pottsville, on Wolf Creek, Slippery Rock Township. Pennsylvania Second Geological Survey, Rept. V, p. 97.
9. Allegheny group, Forks of Slippery Rock Creek, Slippery Rock Township. Pennsylvania Second Geological Survey, Rept. V, p. 102.
10. Allegheny group at North Washington, Washington Township. Pennsylvania Second Geological Survey, Rept. V, p. 109.
11. Allegheny and Pottsville in Parker Township. Pennsylvania Second Geological Survey, Rept. V, p. 116.
12. Allegheny group, at Martinsburg, Parker Township. Pennsylvania Second Geological Survey, Rept. V, p. 119.

COALS.

There are ten coal beds of workable thickness in Butler County. All of these beds except the Mahoning and Bakerstown are in the Allegheny group. The Upper Freeport is mined most extensively.

Generalized section of coal beds in Butler County.

	Bed	Range in interval	Range in thickness	
			Ft. in.	Ft. in.
Allegheny group	Bakerstown		0	3 0
		125		
	Mahoning		6	2 6
		40-55		
	Upper Freeport (E)		1	9 6
		50-65		
	Lower Freeport (D)		0	3 0
		40-89		
	Upper Kittanning (C′)		0	4 6
		40-55		
	Lower Kittanning (B)		0	3 6
		40-60		
	Scrubgrass		1	1 6
		20-30		
	Clarion (A′)		0	7 0
		20-35		
	Brookville (A)		1	4 6

BROOKVILLE (A) COAL.

The Brookville is mined most extensively in the northern part of the county. The northernmost mines are in the vicinity of Deegan, Venango township. The Brookville averages 3 feet 1 inch thick in this vicinity and has a maximum thickness of 5 feet 6 inches. A persistent shale parting, 1 to 6 inches thick, is present 16 inches to 2 feet below the top. The coal is of very good quality with the exception that local lenses of bone and pyrite make the coal rather high in ash and sulphur. At Keenan the Brookville is variable in physical character. In one mine it is divided into three benches, each 14 inches thick, by two shale partings 3 inches thick. In the remainder of the mines in this vicinity the coal occurs in a single bench ranging from 3 to 4 feet thick. At Ferris the coal does not contain any persistent bone and shale partings, and is 4 feet thick. In the vicinity of Higgins Corners the coal is thinner, averaging 3 feet 2 inches. It again occurs in a single bench.

The Brookville is present at a few localities in Allegheny township. At Six Points the coal varies considerably in physical and chemical character. Where thickest it is divided into three benches by two bone and pyrite partings ranging from 1 to 2 inches thick. The top bench averages 11 inches thick; the middle, 1 foot 11 inches; and the bottom, 2 feet. Where thinnest the bed occurs in two benches. A top bench, 8 inches thick, is separated from a bottom bench, 2 feet 4 inches thick, by a shale parting ½ inch thick.

There is one commercial coal mine in the Brookville in Cherry township in the vicinity of Nelsons Bridge on Slippery Rock Creek. At this locality the Brookville is 2 feet 1 inch thick and contains no partings or binders. The presence of local pyrite lenses makes the coal high in sulphur.

One of the chief mining districts of the Brookville in northern Washington County is in the vicinity of Hilliards and Argentine. It is 3 feet 8 inches thick at Argentine, including a 1-inch bone parting 9 inches from the top. East of Argentine the coal is 3 feet 4 inches thick and is divided into two benches by a bone parting 1½ inches thick in the middle of the bed. A coal company operating ½ mile southeast of Higgins Corners in Washington township is working the Brookville, where it occurs in two widely separated benches. The top bench is 2 feet thick separated from a lower bench, 17 inches thick. At Hilliards the coal ranges from 2 feet 10 inches to 3 feet 8 inches thick. It is usually clean, but where thickest a 2-inch bone parting is present a few inches above the bottom.

At Erico Station the bed ranges from 3 feet 10 inches to 4 feet 4 inches thick, and has a 1-inch parting 9 inches from the top. At Goff Station the Brookville is 4 feet 6 inches thick, including the characteristic bone parting.

The Brookville coal is high in volatile matter and very high in ash and sulphur. The ash and sulphur content can be greatly reduced by careful picking on the car or by washing the coal. The bed always carries many lenses of pyrite. It is a bright coal, rather friable, and breaks up when mined. The coal requires washing and picking before it can compete with the higher volatile coals in the Irwin basin.

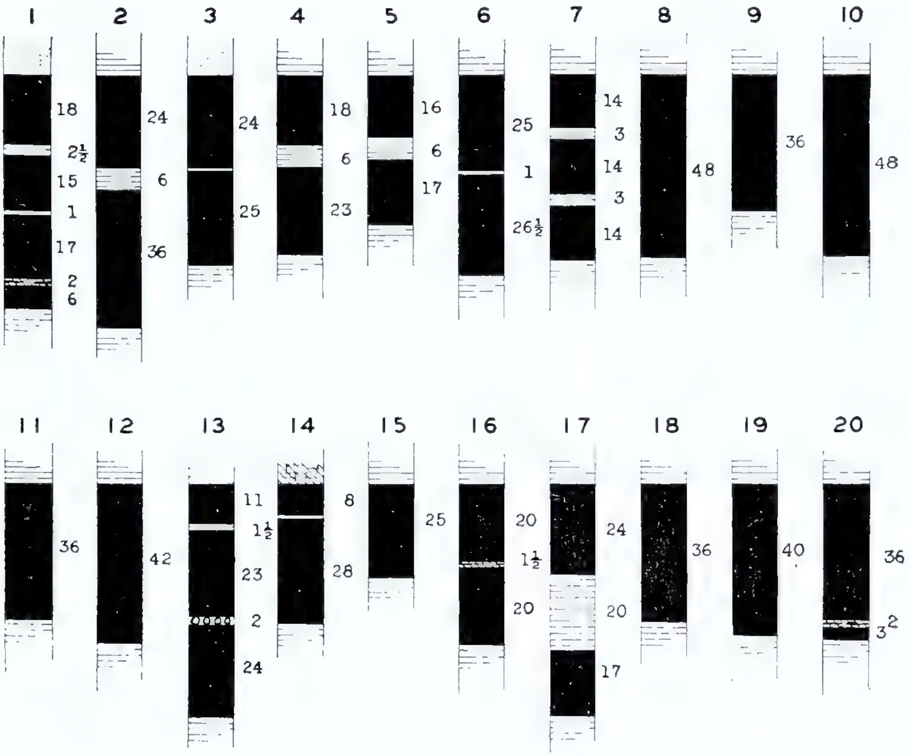


Figure 27. Sections of Brookville coal in Butler County.

1. Outcrop in road 1 mile west of Unity Church, Marion township.
2. Butts Cannel Coal Company. Annandale No. 2 mine, ½ mile northeast of Deegan, Venango township.
3. Erie Coal Mining Company. Keystone No. 3 mine, 1 mile east of Deegan on Seaton Creek, Venango township.
4. S. J. Mountz & Company. Mountz S 106 mine, ½ mile east of Deegan, Venango township.
5. Amick Coal Company. Goff mine, at Deegan, Venango township.
6. Erie Coal Mining Company. Keystone No. 4 mine, 1 mile northeast of Deegan, Venango township.
7. Taylor Coal Company. Taylor mine, at Keenan Station, on B. & L. E. R. R., Venango township.
8. Erie Coal Mining Company. Keystone No. 2 mine, at Keenan Station, on B. & L. E. R. R., Venango township.
9. Annandale Coal Company. Erie No. 1 mine, at Keenan Station on B. & L. E. R. R., Venango township.
10. Erie Coal Mining Company. Keystone No. 1 mine, at Ferris Station on B. & L. E. R. R., Venango township.
11. Valley Coal Company. Cooper mine, ½ mile east of Higgins Corners, Venango township.
12. North East Coal Mining Company. Northeast Nos. 1 and 2 mines, 1 mile northeast of Higgins Corners, Venango township.

13. Country bank, 1 mile southwest of Six Points, Allegheny township.
14. Country bank, 2 miles east of Six Points, Allegheny township.
15. Brookville Thin Vein Coal Company. Dunne No. 2 mine, at Nelsons Bridge on Slippery Rock Creek, Cherry township.
16. Erie Coal Mining Company. Keystone No. 5 mine, $\frac{1}{5}$ mile east of Argentine, Washington township.
17. Standard Coal Company. Hamilton No. 3 mine, $\frac{1}{2}$ mile southeast of Higgins Corners, Washington township.
18. Penn Brook Coal Company. Penn Brook mine, $\frac{1}{3}$ mile northwest of Hilliards, Washington township.
19. Spring Valley Coal Company. Spring Valley mine, $\frac{3}{4}$ mile northwest of Hilliards, Washington township.
20. Outcrop, at Hilliards, Washington township.

CLARION (A′) COAL.

The Clarion coal, lying 20 to 35 feet above the Brookville, is thin and unimportant in Butler County, except at Bruin where it is mined commercially. Here it ranges from 3 feet 10 inches to 7 feet thick, and is separated into two or more benches by shale partings ranging from 6 to 8 inches thick. In certain localities in Parker and Allegheny townships the Clarion is of minable thickness and quality. At Bonus, Allegheny township, the coal averages 3 feet 4 inches, including 2 inches of shale 11 inches below the top. At Stonehouse the coal is 3 feet 4 inches thick, including a thin bone parting 16 inches below the top. At Parkers Landing the Clarion is 3 feet 6 inches thick, including a thin parting of bone 18 inches below the top.

West of Foxburg, in Allegheny township, the Clarion coal is much parted by shale. The coal occurs in four to five benches separated by bone partings, all of which are thin except the one in the top of the bed, which averages 14 inches thick.

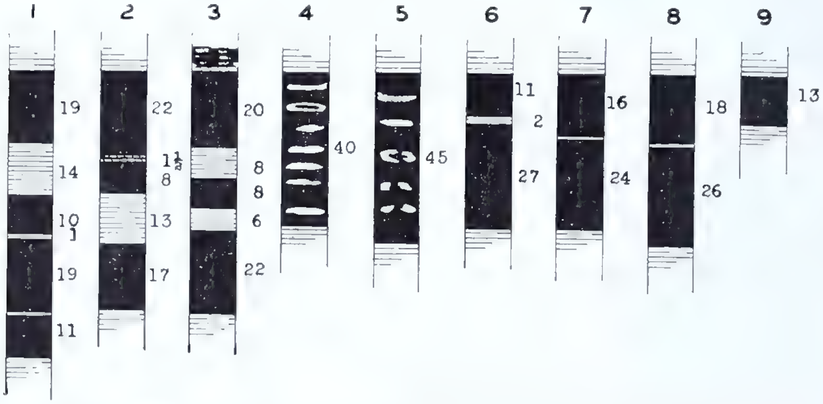


Figure 28. Sections of Clarion coal in Butler County

1. Outcrop 1½ miles west of Foxburg, Allegheny township.
2. Outcrop ½ mile south of Bruin, Parker township.
3. Bruin Coal Company. Bruin mine, at Brain, Parker township.
4. Outcrop ½ mile southwest of Parkers Landing, Parker township. (Lower bench).
5. Outcrop ½ mile northwest of Parkers Landing, Parker township. (Lower bench).
6. Outcrop 1½ miles southeast of Bonus, Allegheny township. (Lower bench).
7. Outcrop ½ mile northeast of Stonehouse, Parker township. (Lower bench).
8. Outcrop 2 miles southwest of Parkers Landing, Parker township. (Lower bench).
9. Outcrop 1¾ miles west of Parkers Landing, Parker township. (Upper bench).

SCRUBGRASS COAL.

The Scrubgrass coal, lying 20 to 30 feet above the Clarion, is present in the northern part of the county, and averages approximately 9 inches thick, with a maximum thickness of 18 inches. The exact geological correlation of this bed is uncertain. It is probably a split from the Clarion.

LOWER KITTANNING (B) COAL.

The Lower Kittanning is important only in a few eastern townships of Butler County where it is peculiarly regular in thickness and physical character. The coal is clean and has excellent quality. In the vicinity of Parkers Landing the outcrops of this bed indicate that it is too thin to be mined, and probably averages less than 2 feet thick. It is being mined in the vicinity of Barber, Worth township, where it is clean and averages 2 feet 10 inches thick. In Brady township, particularly in the vicinity of Osle, it is 3 feet 1 inch thick, and is entirely clean. The same character is persistent on Muddy Creek.

The Lower Kittanning is mined in conjunction with a clay works in Clay township. In the vicinity of Claytonia it is 3 feet 1 inch thick. The average thickness of this bed in Clay township is probably 2 feet 10 inches.

Where mined in the vicinity of Portersville, in Muddy Creek township, the bed is 3 feet 4 inches thick and clean. In Center township a persistent 8-inch bone parting makes its appearance 10 inches below the top. The bed averages 3 feet 7 inches thick, including this bone parting.

The Lower Kittanning is being mined by three commercial companies in Summit township in the vicinity of North Butler. Here the bed is 2 feet 6 inches to 2 feet 8 inches thick. A commercial mine is working the Lower Kittanning in the vicinity of Wahlville in Forward township. The bed is 2 feet 8 inches thick.

The Lower Kittanning is under thick cover in the southeastern townships of Butler County and is not being mined at the present time because the Thick Freeport is present in this area and is now the most important bed. When the Thick Freeport is exhausted the Lower Kittanning will then be mined.

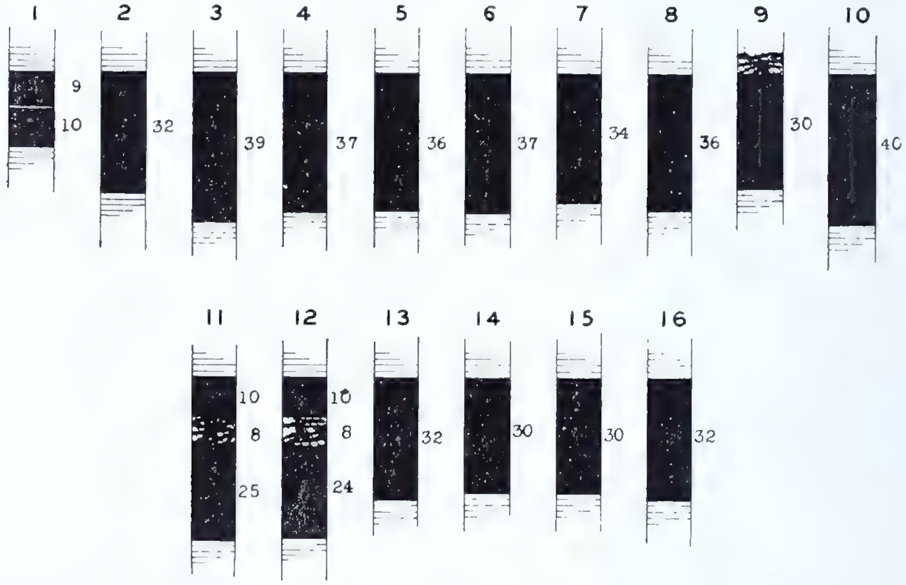


Figure 29. Sections of Lower Kittanning coal in Butler County.

1. Outcrop ½ mile west of Parkers Landing, Parker township.
2. Fox Coal Company. Fox mine, ¾ mile north of Barber, Worth township.
3. Aspinwall Coal Company. Worth mine, 1 mile north of Barber, Worth township.
4. Emery Coal & Mining Company. Lexie No. 2 mine, 1 mile northwest of Osle, Brady township.
5. Lincoln Mining Company. Lincoln mine, 2 miles west of Mercer Road, on Muddy Creek, Brady township.
6. Gracemont Coal Company. Gracemont mine, at Claytonia, Clay township.
7. Mizener Coal Company. Grant mine, ¾ mile east of Claytonia, Clay township.
8. F. P. Filer & Company. Kildoo No. 1 mine, near Sherwin, 1½ miles northwest of Euclid.
9. Black Block Coal Company. Gray No. 1 mine, ⅕ mile east of Mercer Road, Clay township.
10. Portersville Coal Company. Bear Run mine, ⅕ mile south of Portersville Station, Muddy Creek township.
11. T. W. Palmer. Jewell mine, 1 mile south of Queen Junction, Center township.
12. Cochrane Coal Company. Liberty mine, 1 mile south of Queen Junction, Center township.
13. North Butler Coal Company. Calvin mine, ¼ mile north of North Butler, Summit township.
14. Butler Coal Mining Company. Butler No. 1 mine, at North Butler, Summit township.
15. Brier Hill Coal Company. Brier Hill mine, ¼ mile south of North Butler, Summit township.
16. Emberhill Fuel Company. Brewster No. 2 mine, ¾ mile northwest of Wahlville, Forward township.

Middle Kittanning (C) Coal.

The Middle Kittanning coal lies 40 to 70 feet above the Lower Kittanning, and is very persistent and clean. On the West Branch of Big Buffalo Creek, in Clearfield township, it is locally 4 feet 6 inches thick and is separated by an upper and lower shale parting, 6 to 12 inches thick, into two 2-foot benches and a 6-inch bench. The Middle Kittanning coal has its northern outcrop in Mercer township and is mined by a few country banks in the vicinity of Harrisville. It averages 2 feet 8 inches thick, including a bone parting 1 inch thick 14 inches below the top. This thickness is persistent throughout Marion and Venango townships, although locally bone and shale partings destroy the commercial value of the coal.

In the vicinity of Emlenton, Allegheny township, the bed is 2 feet thick and clean. The Middle Kittanning increases in thickness southward, and in the vicinity of Bruin is 4 feet 2 inches thick, including a persistent shale parting 2 inches thick 13 inches below the top. The lower bench, which is usually 3 feet thick, has many lenses of bone and pyrite in it.

The commercial value of the Middle Kittanning in Washington township is extremely doubtful. Outcrops in Cherry township indicate that it is locally minable; in fact, one mine in the vicinity of Bovard has attempted to produce this coal. The bed is 2 feet 7 inches thick, including a 2-inch shale parting 6 inches above the bottom.

The Middle Kittanning is being mined at Claytonia in Cherry township, where it averages 3 feet thick. The same thickness was measured in a mine at Nealeys station on Big Run, Worth township. One mine is working the Middle Kittanning on Muddy Creek two miles west of the Mercer road. Here the coal is 3 feet 3 inches thick and comparatively clean. A country bank on Muddy Creek in southwest Brady township is mining the Middle Kittanning, where it averages 2 feet 9 inches thick.

The Middle Kittanning is under cover in the southeastern townships of Butler County. Drill hole records indicate that it is extremely variable in thickness, and its future commercial value is extremely doubtful. The Lower Kittanning will be mined out first and whatever value the Middle Kittanning might have will be destroyed by subsidence.

The following sections illustrate the occurrence of the Middle Kittanning in Butler County:

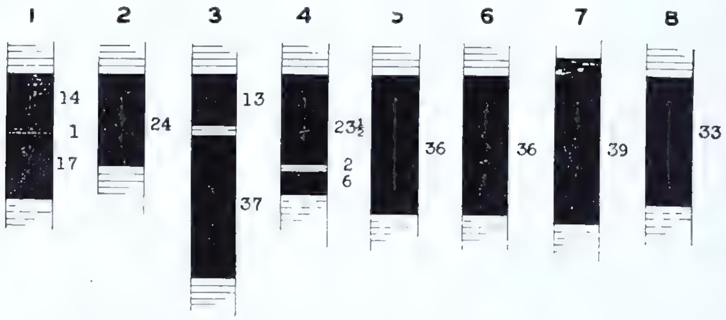


Figure 30. Sections of Middle Kittanning coal in Butler County.

1. Country bank, 1½ miles south of Harrisonville, Mercer township.
2. Outcrop 2 miles west of Emlenton, Allegheny township.
3. Outcrop ½ mile southwest of Bruin, Parker township.
4. Outcrop in road, 1¾ miles southeast of Bovard, Cherry township.
5. Hallston Coal Company. Hallston mine, 2 miles north of Claytonia, Cherry township.
6. Neeley Mining Company. Lexie No. 1 mine, at Neeleys Station, on Big Run, Worth township.
7. F. P. Filer & Company. Kildoo No. 2 mine, on Muddy Creek, 2 miles west of Mercer Road.
8. Country bank, on Muddy Creek, in southwest Brady township.

Upper Kittanning (C′) Coal.

The Upper Kittanning, lying 40 to 55 feet above the Middle Kittanning, is mined at numerous localities in Butler County. The northernmost mine in the Upper Kittanning is in the vicinity of Adams Corners, Slippery Rock township. In this locality the coal ranges from 2 feet 4 inches to 2 feet 10 inches thick, and is fairly clean. Numerous country banks are mining the Upper Kittanning in Cherry, Washington, and Fairview townships. The coal is extremely variable in thickness, ranging from a few inches to 5 feet. This coal is of value for local use to the farmers but it is doubtful if an area large enough to be mined on a commercial scale can be proven. The bed is locally cannel in Washington township.

The Upper Kittanning is fairly persistent in thickness in Muddy Creek township and has been mined for local use. It ranges from 2 feet to 3 feet 4 inches thick. It is locally entirely clean, but within a few hundred yards its worth is destroyed by many lenses of bone and shale. Its physical character is so variable that it cannot be described except by numerous local sections.

The Upper Kittanning assumes some commercial value in Center township, and is being mined on a commercial scale by four companies. At Jamisonville the coal is 3 feet 4 inches thick and does not contain any persistent bone partings. A mine on Connoquenessing Creek reports that the Upper Kittanning is 2 feet 6 inches thick, including a 1-inch bone parting 10 inches below the top.

North of North Butler the coal is 2 feet 10 inches thick, including a 2-inch bone parting 8 inches below the top. Three miles north of Butler the coal has practically the same thickness. At Oneida station the coal is 2 feet 5 inches thick, including a thin bone parting 7 inches below the top. The Upper Kittanning has a local maximum thickness of 3 feet 1 inch in Lancaster township. In northern Butler township the average thickness of the Upper Kittanning is 2 feet 6 inches, in all of which is commercial coal. Locally numerous bone and pyrite lenses make the coal absolutely impossible for fuel.

The Upper Kittanning outcrops on Connoquenessing Creek in Jackson township. Outcrop measurements vary exceedingly. The coal appears to average slightly less than 3 feet and contains a thin bone parting near the middle.

The Upper Kittanning may be minable in townships which have not been mentioned in this district. If such townships have been ignored it is because of the limited quantity of data. It is impossible to cover in detail all of the beds of Butler County within the time allotted for this work. The beds with the most promise of future value were given the preference.

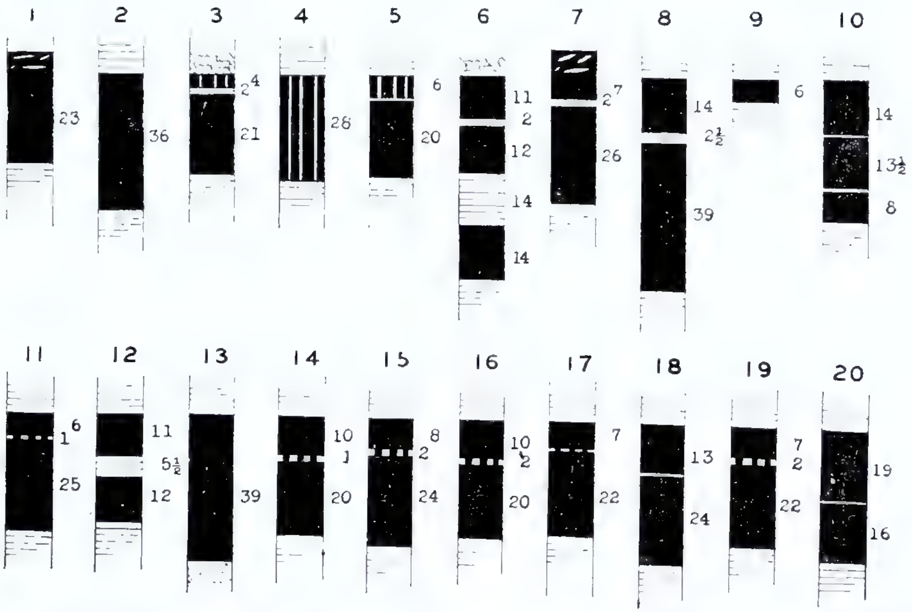


Figure 31. Sections of Upper Kittanning coal in Butler County.

1. Outcrop at Murrinville, Venango township.
2. Filer & Owens. Owens mine, at Adams Corners, Slippery Rock township.
3. Country bank at Five Points, Cherry township.
4. Outcrop at North Washington, Washington township.
5. Country bank in southeast corner of Washington township.
6. Country bank at Stone House, Brady township.
7. Country bank, 1 mile west of Stone House, Brady township.

8. Outcrop ½ mile southeast of Petrolia, Fairview township.
9. 200 yards from section No. 8.
10. Outcrop on east branch of Yellow Creek, Muddy Creek township.
11. Outcrop on headwaters of east branch of Yellow Creek, Muddy Creek township.
12. Abandoned country bank on Muddy Creek, Franklin township.
13. Jamisonville Coal Company. Jamisonville mine, at Jamisonville Station, Center township.
14. Victoria Coal Company. Victoria mine, on Connoquenessing Creek, 4 miles north of Butler, Center township.
15. Cosco Coal Company. Cosco mine, on Connoquenessing Creek, 1¼ miles north of North Butler, Center township.
16. Zenith Coal Company. Zenith No. 1 mine, on Connoquenessing Creek, 3 miles north of Butler, Center township.
17. Oneida Coal Company. Oneida mine, at Oneida Station, Center township.
18. Country bank on Yellow Creek near forks with Little Connoquenessing Creek, Lancaster township.
19. Zenith Coal Company. Zenith No. 2 mine, ⅕ mile north of North Butler township.
20. Outcrop on Connoquenessing Creek near Eideman, Jackson township.

Lower Freeport Coal.

The Lower Freeport coal lies approximately 70 feet above the Upper Kittanning. It is a persistent, thin bed, rarely of minable thickness. Its outcrop has been measured at numerous points in the northern townships, and its variation in thickness and physical character is striking. Locally it is a thick bed of good quality; for example, two miles northeast of Petrolia, Parker township, where the coal is 4 feet 5 inches thick, and of good quality. It is also of minable thickness in the vicinity of Bonus, Allegheny township. This thickness may be local. A few country banks have mined the Lower Freeport for local fuel in Clay township. A section measured in a country bank at West Sunbury is as follows:

Section of Lower Freeport coal at West Sunbury.

	Ft.	in.
Coal	2	1
Shale	0	11
Coal	2	0

The coal appears to thin gradually on both sides of this opening.

A commercial mine is working the Lower Freeport at Harmony Junction, Jackson township. Here the coal is 2 feet 10 inches thick. In other localities in Jackson township the bed appears to be persistently split near the middle by a shale parting 1 foot 10 inches to 2 feet thick. The Lower Freeport is not being mined east of Jackson township with the exception of Clearfield and Winfield townships. In Clearfield township three commercial mines are working the Lower Freeport in the vicinity of Fenelton. At this locality the Lower Freeport averages 4 feet thick, including a shale parting ranging from 7 to 14 inches thick 18 inches below the top. This thickness appears to be characteristic of this vicinity alone. Outcrop indications in other parts of Clearfield township are not altogether favorable.

The Lower Freeport is being mined in the vicinity of Cabot, Winfield township. It averages 3 feet 1 inch thick and is a fairly good coal.

The following sections are typical of the Lower Freeport in Butler County:

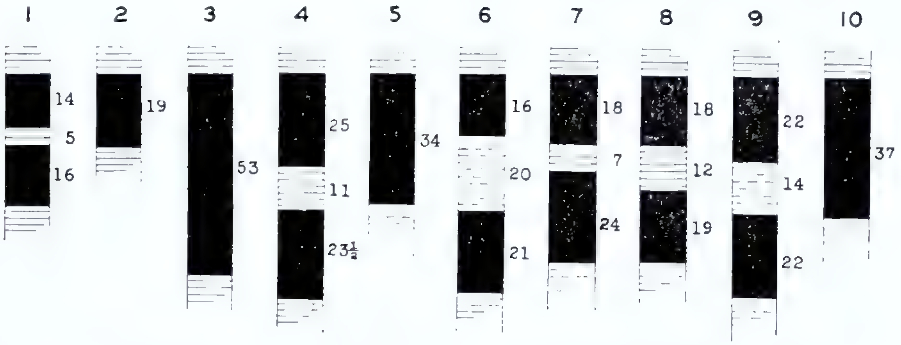


Figure 32. Sections of Lower Freeport coal in Butler County.

1. Outcrop near Bonus, Allegheny township.
2. Outcrop 1½ miles west of West Monterey, Parker township.
3. Outcrop 2 miles northeast of Petrolia, Parker township.
4. Country bank at West Sunbury, Clay township.
5. North Pittsburgh Realty Company. Harmony Junction mine, at Harmony Junction, Jackson township.
6. Outcrop on Connoquenessing Creek at Peffer's bridge, Jackson township.
7. Consolidated Coal & Coke Company. DuBois No. 7 mine, ¼ mile west of Fenelton, Clearfield township.
8. Fenelton Coal Company. Fenelton mine, at Fenelton, Clearfield township.
9. Consolidated Coal & Coke Company. Consolidated mine, on Little Buffalo Creek, ¾ mile east of Fenelton, Clearfield township.
10. Little Buffalo Coal Company. Cabot mine, 1 mile south of Cabot, Winfield township.

Upper Freeport (E) Coal.

The Upper Freeport lies about 60 feet above the Lower Freeport coal. In the western part of the county its thickness is very irregular, with a maximum of 2 feet and its average much less. Its principal mining importance is in the eastern and southern townships.

The northernmost mines in the Upper Freeport are in Clay, Concord, and Fairview townships. In the vicinity of Queen Junction, Clay township, the Upper Freeport is 6 feet thick and entirely clean. This thickness does not persist over large areas, but the average thickness of the bed is over 4 feet. At West Sunbury the bed is 4 feet 7 inches thick, including 15 inches of bone coal at the bottom.

At Greece, in Concord township, the coal is 2 feet 10 inches thick, and has no persistent bone or shale partings. In the vicinity of Utley, Concord township, the coal ranges from 2 feet 4 inches to 2 feet 6 inches thick, and locally includes a 2-inch sulphur parting 2 inches above the bottom.

At Fairview township, the coal is 2 feet 7 inches thick. In the vicinity of Karns City, where the coal is being mined for commercial shipment, it averages 3 feet 4 inches thick and is usually without partings or binders.

In Center township the coal varies much in physical character, but its thickness is usually 3 feet 10 inches. It is entirely clean. On Connoquenessing Creek, in Oakland township, the coal is 3 feet thick, including a 2-inch shale binder in the middle.

The Upper Freeport is being mined in the vicinity of Chicora, Donegal township, where it averages 3 feet 5 inches thick and is entirely clean. The Upper Freeport is not being mined commercially in Connoquenessing township, where it appears to average 2 feet 6 inches thick. It is being mined in Butler township, and is locally 3 feet 6 inches thick and is entirely clean.

The Upper Freeport is being mined on Coal Run in Summit township, and averages 2 feet 10 inches thick. In the vicinity of Fenelton it averages 4 feet thick, including a 2-inch bone parting 1 foot 8 inches above the bottom. Outcrops of the Upper Freeport are numerous in Winfield township, but it is not being mined commercially. It averages 3 feet 2 inches thick, including a 2-inch parting 4 inches above the bottom.

In Penn township the Upper Freeport averages 2 feet 6 inches thick. Local areas are much thicker. In Forward township the coal is 2 feet 6 inches thick, including 5 inches of cannel coal near the top of the bed. Local areas deviate much from this average thickness.

The Upper Freeport is being mined in the vicinity of Evans City, Jackson township, where it averages 3 feet 4 inches thick and is comparatively clean. Near the Beaver County line, in Cranberry township, the coal is 3 feet 4 inches thick but contains approximately 8 inches of bony coal near the middle.

The Upper Freeport varies much in physical character in Adams township, but it averages less than 2 feet 6 inches thick. The coal is generally very clean. The Upper Freeport increases in thickness in Clinton township, and is mined commercially. The bed averages 4 feet 2 inches thick, including a shale parting 4 to 8 inches thick 10 inches below the top.

The most important mining center of the Upper Freeport in Butler County is in Buffalo township. The bed is persistent in physical character, and is usually divided into two benches by a shale parting 1 to 2 inches thick 4 to 5 inches above the bottom. The coal is clean and of excellent quality.

The following sections are characteristic of the Upper Freeport in Butler County:

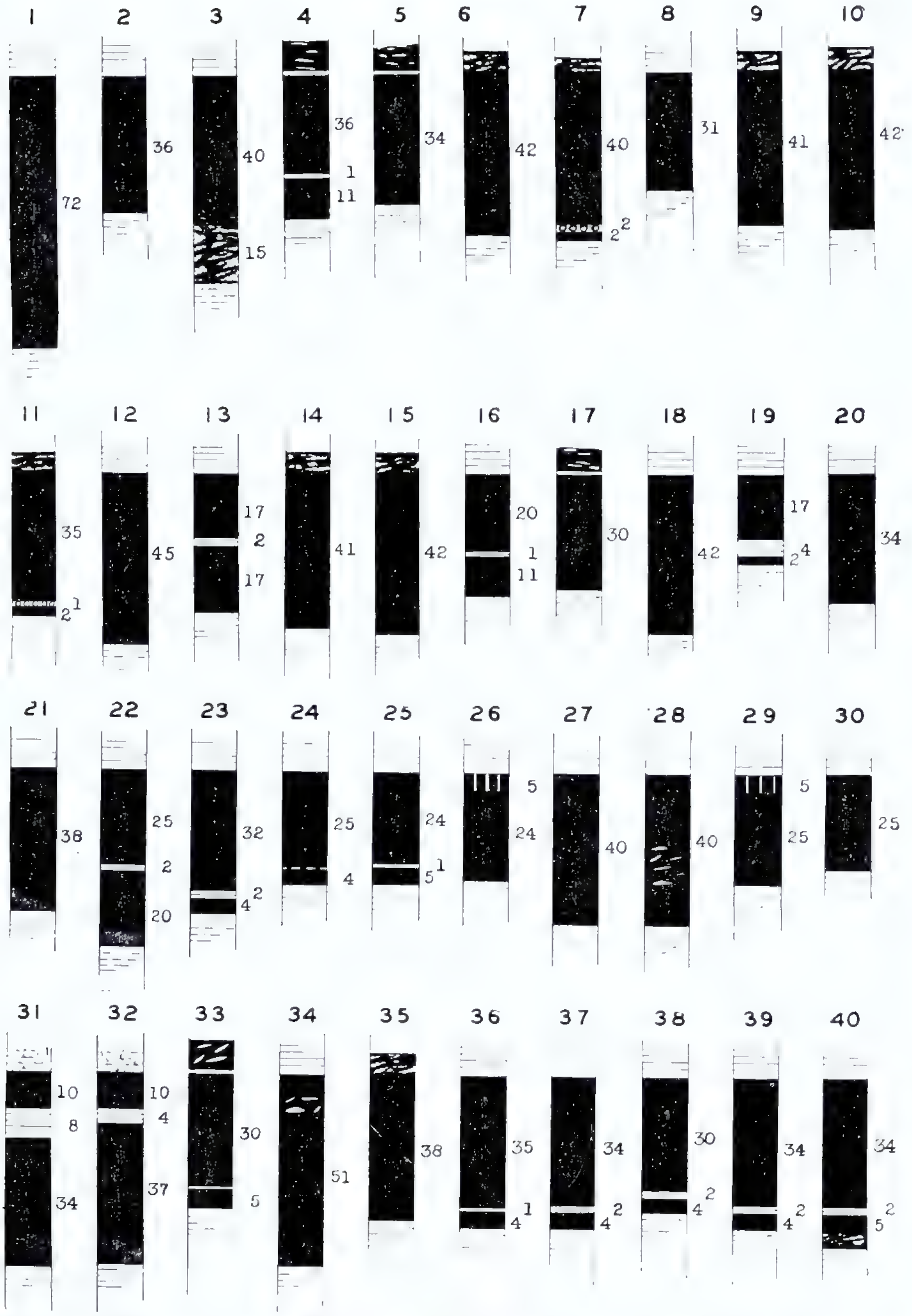


Figure 33. Sections of Upper Freeport coal in Butler County.

1. Palmer Coal Company. Palmer mine, 1¼ miles southeast of Queen Junction on Muddy Creek, Clay township.
2. Section ¼ mile from Section 1.
3. Abandoned country bank at West Sunbury, Clay township.
4. Country bank, 1 mile southwest of West Sunbury, Clay township.
5. Country bank at Greece, Concord township.
6. Burns Coal Company. Sutton mine, near Utley, Concord township.
7. Haney Coal Company. Haney mine, 1 mile west of Utley, Concord township.
8. Outcrop at Fairview, Fairview township.
9. MacDonald Coal Company. Liggett mine, near Karns City, Fairview township.

10. S. Sherwin. Kincaid mine, 2 miles southwest of Karns City, Fairview township.
11. S. Sherwin. Enterprise mine, ½ mile south of Karns City, Fairview township.
12. Wigton Coal Company. Wigton mine, near Eliott School, Center township.
13. Outcrop on Connoquenessing Creek, Oakland township at Concord township line.
14. DeWolf Holben Coal Company. Holben mine, 2 miles northwest of Chicora, Donegal township.
15. Crock Coal Company. Betty mine, at Chicora, Donegal township.
16. Outcrop on Crab Run, Connoquenessing township.
17. Outcrop on Butchers Run, Butler township.
18. Vanmore Coal Company. Vanmore mine, ¼ mile southwest of Lydora, Butler township.
19. Outcrop on Coal Run, ¾ mile west-northwest of Brinker.
20. Coal Run Coal & Coke Company. Coal Run mine, on Coal Run, 3 miles southeast of Butler, Summit township.
21. Vogeley Coal Company. Vogeley mine, on Coal Run, 2 miles south of Butler, Summit township.
22. Roy S. Imbrie. Good Luck mine, 2½ miles northwest of Fenelton, near Lucasville, Summit township.
23. Outcrop on Rough Run, near Clearfield township line, Winfield township.
24. Outcrop on Thorn Creek, near western Winfield township line.
25. Outcrop in Thorn Creek at Rockdale, Penn township.
26. Outcrop on Breakneck Creek, 1 mile southwest of Watters (Carr P. O.), Forward township.
27. Klee Coal Company. Fay mine, ½ mile west of Evans City, Jackson township.
28. Outcrop on Brush Creek near Beaver County line, Cranberry township.
29. Outcrop on Breakneck Creek, near Cranberry township line, Adams township.
30. Outcrop on Glade Run, near eastern line of Adams township.
31. Mar Coal Company. Mar mine, near Refractories Station on B. & L. E. Railroad, Clinton township.
32. Sun Coal Company. Sun mine, at Cunningham Station, on B. & L. E. Railroad, Clinton township.
33. Outcrop at Lardintown, Clinton township.
34. Outcrop on Sarver Run, near Coal Hollow, Buffalo township.
35. Sarver Gas Coal Company. Sarver mine, ¼ mile northwest of Sarver, Buffalo township.
36. Radient Coal Company. Radient mine, on west bank of Buffalo Creek, at Winfield Junction, Buffalo township.
37. Ben Way Coal Company, Ben Way mine, on east bank of Buffalo Creek, ⅕ mile north of Winfield Junction, Buffalo township.
38. McAnulty Coal Company. McAnulty mine, on south bank of Buffalo Creek, ⅕ mile west of Harbinson Station, Buffalo township.
39. Sarver & Henderson Coal Company. Estella mine, on south slope of Buffalo Creek, ⅕ mile southwest of Harbinson, Buffalo township.
40. Kerr Coal Company. Kerr No. 2 mine, on west slope of Buffalo Creek at Lane Station, Buffalo Creek at Lane Station, Buffalo township.

BRUSH CREEK (GALLITZIN) COAL.

The Brush Creek Coal, lying about 55 feet above the Upper Freeport, is a thin persistent bed in southern Butler County. It rarely exceeds 2 feet, and averages about 12 inches thick. It is generally a good clean coal, highly prized for smithing and domestic use. It has been entirely eroded in the northern part of the county.

BAKERSTOWN COAL.

The Bakerstown Coal, occurring about 125 feet above the Brush Creek coal, is thin and used only as a supply for house fuel. Its maximum thickness is 3 feet, and its average thickness is less than 12 inches.

CHAPTER VI.

CAMBRIA COUNTY.

INTRODUCTION.

Cambria County ranks fourth in Pennsylvania as a producer of bituminous coal. It ships more bituminous coal for export than any other county in the State. A large quantity also is distributed by boat and rail along the Atlantic Coast. Its central location in the smokeless steam coal district of the State, its fine transportation facilities, and the great demand for the excellent coal, which, for its type, is the best in the State, increased the Cambria County production enormously.

Cambria County is one of the few counties in the bituminous coal region having four important coal beds. These beds have good thickness in different parts of the county, and also are exceptionally free from impurities and remarkably uniform in composition. Cambria County has at least 24 recognizable coal beds, including four important ones and five others which are workable locally; the rest are very thin. The total average thickness of all the beds is about 40 feet.

Although Cambria County has been a large producer for many years, there are enormous beds of good coal just being prospected by the core drill. The coals still untested by the drill may be expected to maintain the thickness and quality shown in adjoining areas where they are now mined.

The coal is transported entirely by railroad and highway. The railroads of Cambria County are one of the greatest assets of its coal trade. The main line of the Pennsylvania Railroad follows Conemaugh River across the county. That line, with its branches to the mining towns, gives the best of facilities for moving coal to eastern cities, tidewater, the Central States, and Lake trade. The Baltimore and Ohio Railroad running from Johnstown to the main line at Rockwood is another direct route to both eastern and western coal trade centers. The New York Central and Hudson River Railroad carries Cambria County coal north to other counties in Pennsylvania which are barren of coal, to New York State, and to the New England States. The railroad facilities, as well as the excellent quality and reputation of the coals, have made Cambria County one of the largest producers of bituminous coal in the State.

Cambria County is well supplied with State and township roads. Recently the State roads have been improved in many localities, and plans have been made for improving many miles of them in the future. The township roads are dirt, but most of them are kept in good condition. The highways are not used extensively for transporting coal.

The northern part of the county is hilly, with summits ranging from 1500 to 2400 feet above sea level. The uplands have gently rounded outlines, cut by numerous valleys from 300 to 500 feet deep. The southern part of the county is decidedly hilly. The slopes are gentle, but there is very little level ground. Conemaugh River flows in a deep narrow gorge which it has cut across the geologic structure. The extreme eastern part of the county is mountainous.

STRUCTURE.

There are eight distinct major structural features in Cambria County, all of which affect the position and depth of the coal beds. These are, in order from east to west, as follows: Nittany anticline, Wilmore syncline, Ebensburg anticline, Bradley syncline, Johnstown syncline, Laurel Hill anticline, Barnesboro syncline, and Nolo anticline. Each structure has a general northeast-southwest trend. Some are more pronounced than others, but each plays a part in the formation of the different basins of the county. The Nittany anticline at the eastern edge of the county and the Laurel Hill anticline at the western edge are the most extensive and pronounced structural features.

The Allegheny Front, which marks the east boundary of the county, is an escarpment made by upturned beds on the northwest bank of the eroded Nittany anticline.

The rocks descend sharply from this ridge into the Wilmore syncline, a drop of 1700 feet in 5½ miles. This basin is narrow and shallow and in the northern part of the county tails out a few miles north of St. Augustine. The syncline is larger in the southern part of the county and rises rapidly to the southwest.

Ebensburg (Viaduct) anticline lying west of the Wilmore syncline, is small in the northern part of the county, having only 200 feet greater altitude than the synclines on either side of it. Farther south the rocks rise rapidly and regularly to the west.

Bradley syncline, lying northwest and approximately parallel to the axis of Ebensburg anticline, reaches its greatest development in the northern part of the county. This is a minor structure; the slope of the beds is gentle and the trough is shallow.

Johnstown syncline lies farther west on the same general northeast-southwest line. The slope of the rocks is gentle on the east flank of this syncline, the maximum dip being about 100 feet to the mile. The beds rise rapidly on the west flank to the crest of Laurel Hill anticline.

Laurel Hill anticline is one of the largest folds in the plateau region. The dips are very uniform on both flanks of the anticline but increase from the north to the southwest line of the county, where the greatest rise is 2100 feet in 9 miles on its eastern flank.

Barnesboro syncline occupies a small area in the northwestern part of the county at Nipton. It is 2 miles wide at Nicktown. At Barnesboro and Westover the axis varies much in altitude.

Nolo anticline barely cuts the northwestern corner of the county. It is a sharp fold, having as high as 5 per cent dip on its western flank.

STRATIGRAPHY.

The outcropping rocks of Cambria County are confined to the Quaternary system and to the Pennsylvanian and Mississippian series of the Carboniferous system. The Monongahela, Conemaugh and Allegheny groups and the Pottsville series are coal bearing.

The Quaternary system is present in the valleys and flood plains and is composed of clay, sand, and gravel.

The Monongahela group has been entirely eroded except a few acres of so-called Pittsburgh coal under thin cover remaining in a hilltop in the Wilmore syncline. This coal is the highest stratigraphic unit in the county.

The Conemaugh group, composed chiefly of shale and heavy sandstone, with many thin beds of impure limestone and thin coals, has been much eroded.

The Allegheny group with its valuable coals outcrops well up on the hill slopes. It is composed of dark shales, local heavy beds of sandstone, and clay beds. This group remains practically intact except where streams have cut channels through it; in large areas it will be necessary to shaft for the coals near its base.

The Pottsville series, composed of two massive sandstones, shales, a flint clay, and an unimportant coal bed, is also largely intact. Its outcrops are few, coming to the surface in the deepest valleys where streams have cut across anticlines.

The Mauch Chunk group is red and green shale with a heavy sandstone near the middle. It is exposed only in a few localities.

The Pocono group is composed entirely of grayish-green sandy shale and sandstone. It outcrops at one point in the deep channel of Conemaugh River.

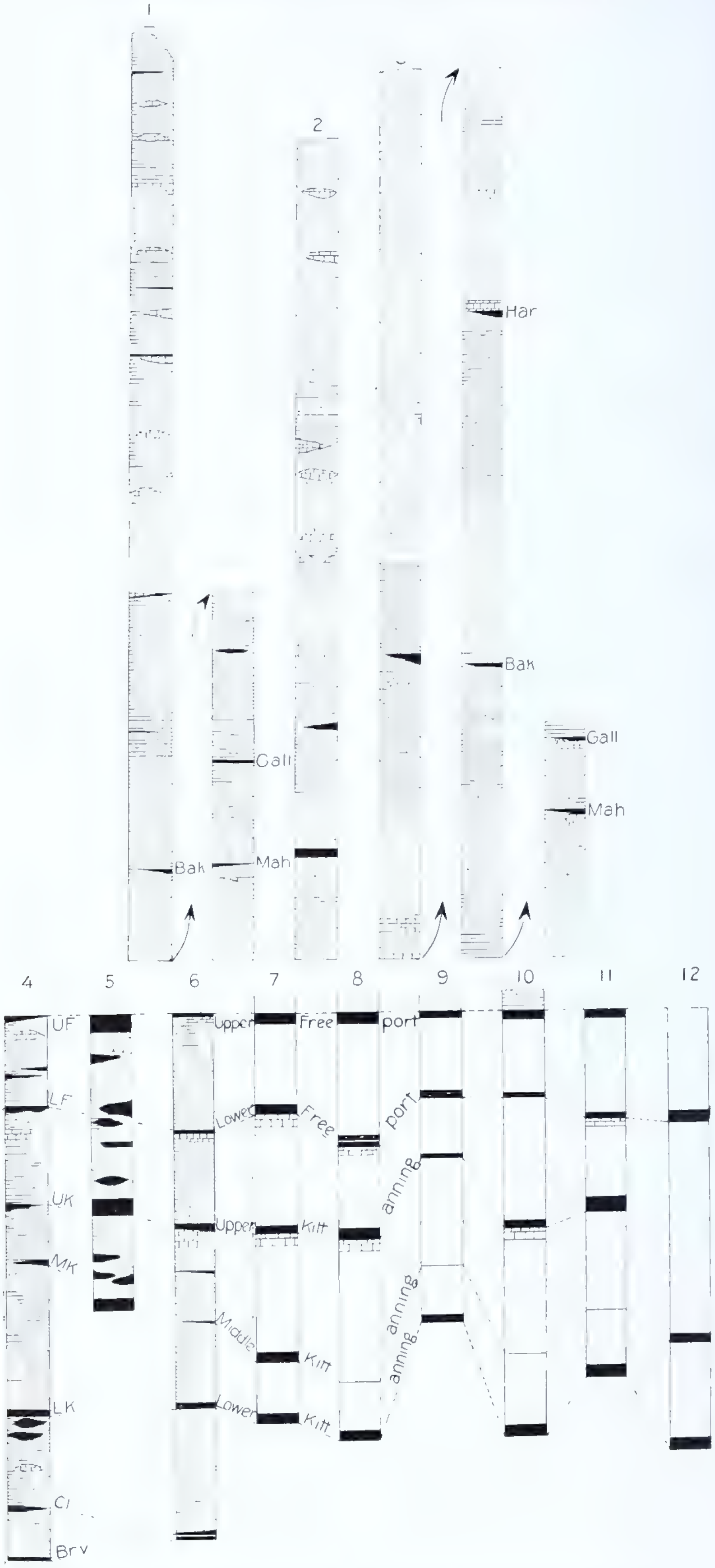


Figure 34. Stratigraphic sections, Cambria County.

1. Generalized section, Conemaugh group. U. S. G. S. Barnesboro-Patton Folio, p. 3.
2. Generalized section, Conemough group. U. S. G. S. Ebensburg Folio.
3. Generalized section, Conemaugh group. U. S. G. S. Johnstown Folio.
4. Generalized section, Allegheny group. U. S. G. S. Barnesboro-Patton Folio.
5. Generalized section, Allegheny group. U. S. G. S. Ebensburg Folio.
6. Generalized section, Allegheny group. U. S. G. S. Johnstown Folio.
7. Compiled section near Coopersdale. U. S. G. S. Bulletin 447, p. 24.
8. Compiled section on Peggys and Clapboard runs. U. S. G. S. Bulletin 447, p. 24.
9. Section north of South Fork. U. S. G. S. Bulletin 447, p. 24.
10. Section south of South Fork. U. S. G. S. Bulletin 447, p. 24.
11. Compiled section near southern border of Cambria County, U. S. G. S. Bulletin 447, p. 24.
12. Section on Blacklick Creek, U. S. G. S. Bulletin 447, p. 24.

COALS.

The coal-bearing rocks in Cambria County contain some twenty coals. Four are of great importance in large areas.

Generalized Section of Coal Beds in Cambria County.

Group	Bed	Range in interval	Range in thickness	
			Ft.	in.
Conemaugh 775-900	Coal		1	9
		325		
	Coal			9
		165		
	Bakerstown			6
		135		
	Gallitzin			6
		50		
	Mahoning			6
		50		
Allegheny 220-375	Upper Freeport (E)		3	6
		40		
	Lower Freeport (D)		2	6
		35		
	Upper Kittanning (C′)		2	6
		70		
	Middle Kittanning (C)			6
		20		
	Bens Creek		1	
		15		
	Lower Kittanning (B)		3	6
		35		
	Clarion (A′)			6
		25		
	Brookville (A)		1	
		80		
Pottsville	Mercer			6

The Lower Kittanning coal is the most persistent bed in the county. It has great importance in the southern part of the county, where it is highly prized as a steam coal. In the northern half of the county also it is a persistent bed with good thickness and quality; its development has been slow because it is below drainage under most of the county, and other good coals are more easily accessible.

The Upper Kittanning lies about 125 feet above the Lower Kittanning. It is mined extensively for steam coal in the southern part of the county, where it reaches its greatest thickness and importance. Development of this coal began in the northern part of the county at Hastings and later spread to Patton, where it is thinner and of poorer grade than in the Johnstown region.

In the northern part of the county the Lower Freeport is an excellent coking coal with low sulphur content and is therefore more widely prospected and developed than the other beds. In the southern half of the county it is mined at many places, especially in the Johnstown region, but it is poorer than the other coals and has been tested in only a few places by drill. This bed is 120 to 190 feet above the Lower Kittanning coal.

Thirty to forty feet higher in the geologic column is the Upper Freeport bed. The coal is used in railroad locomotives and with varying results in making coke. It has been mined principally in the Barnesboro region although the quality is poorer in the north half of the county on account of higher percentage of ash and sulphur than in the other beds. The Upper Freeport is thicker and better in the southern part of the county and is mined in many places.

Five other beds are mined for custom coal; the remaining eleven are so thin that they may never be mined.

The Mercer coal is geologically the lowest coal in Cambria County. It is thin and mixed with many partings of bone and shale. At South Fork its horizon is of commercial importance because it is associated with a valuable bed of flint clay.

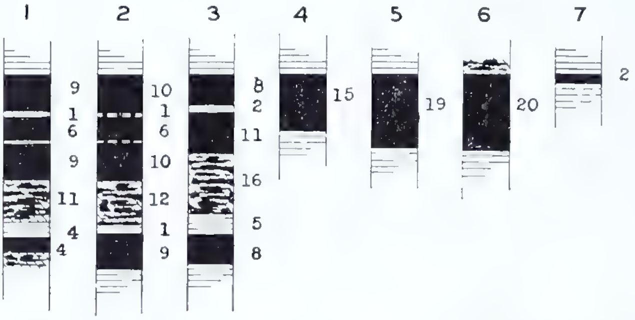


Figure 35. Sections of Mercer coal in Cambria County.

1. Outcrop, southeast of Kring station, Richland township.
2. Outcrop in B. & O. R. R. cut north of Ingleside near Kring, Richland township.
3. Bore Hole on Stony Creek, Stony Creek township.
4. Outcrop, north of Sheridan, Lower Yoder township.
5. Outcrop, 2 miles southeast of Conemaugh Furnace.
6. Outcrop on Clapboard Run, Conemaugh township.
7. Outcrop at South Fork, Croyle township.

The Brookville bed lies from 40 to 100 feet below the Lower Kittanning. This bed is 4 feet thick at Dysart and on Stony Creek. Large numbers of knife blades and nodules of iron pyrite, and partings of shale and bony coal make it so high in ash and sulphur that it cannot be profitably mined, although the fixed carbon and the volatile matter compare well with the Lower Kittanning.

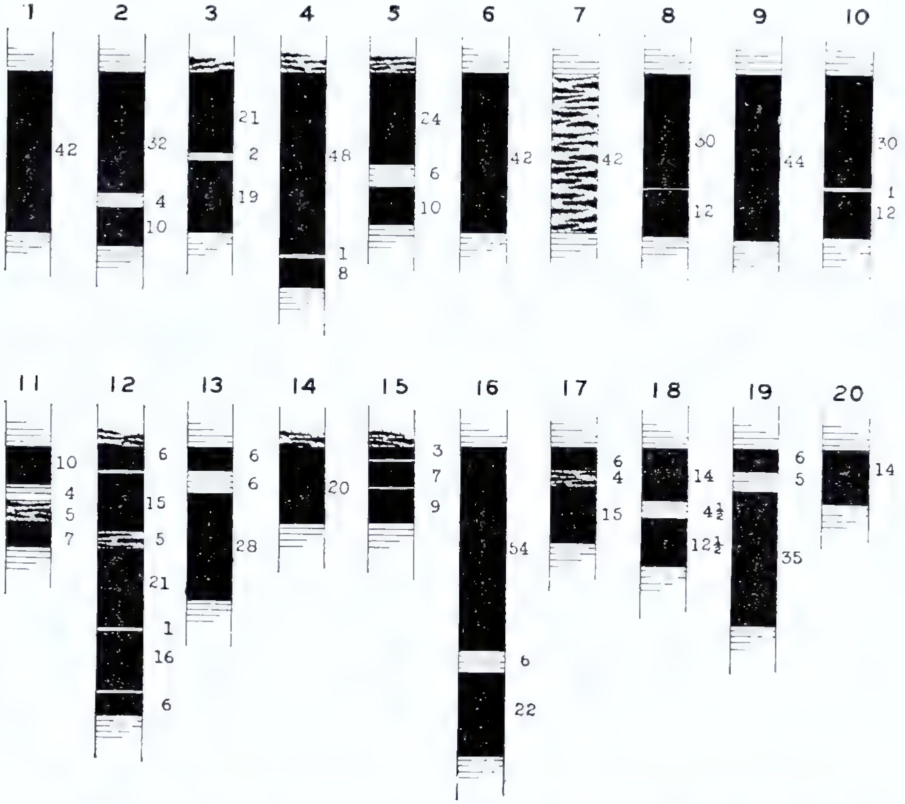


Figure 36. Sections of Brookville coal in Cambria County.

1. Harbison-Walker Refractories Co. Cambria No. 1 mine, at Blandburg, Reade township.
2. Outcrop, ½ mile northwest of Buckhorn, Dean township.
3. Outcrop near Bennington, Gallitzin township.
4. Outcrop, 1 mile east of Dysart, Dean township.
5. Outcrop on Bens Creek, Washington township.
6. Drill hole near signal tower on P. R. R. between Wilmore and Summerhill, Croyle township.
7. Outcrop at South Fork.
8. Outcrop at South Fork.

9. H. C. Stineman Coal Co. Mine No. 6, in South Fork boro.
10. South Cambria Coal Co. Ryan No. 1 mine, 3½ miles south of Dunlo, Adams township.
11. Outcrop at Scalp Level, Richland township.
12. Paint Creek Smokeless Coal Co. Paint Creek mine, ¾ mile southwest of Scalp Level, Richland township.
13. Outcrop on south boundary of the county, Richland township.
14. Outcrop on Clapboard Run, Conemaugh township.
15. Outcrop on Clapboard Run, Conemaugh township.
16. Outcrop at Johnstown.
17. Outcrop at pumping station of Bethlehem Steel Co., Coopersdale, West Taylor township.
18. Drill hole near Nanty Glo, Jackson township.
19. Outcrop on South Branch of Blacklick Creek, Black Lick township.
20. Outcrop near Weber, Black Lick township.

The Clarion bed, lying 20 to 40 feet above the Brookville coal, is seldom over 12 inches thick in the county and is never mined.

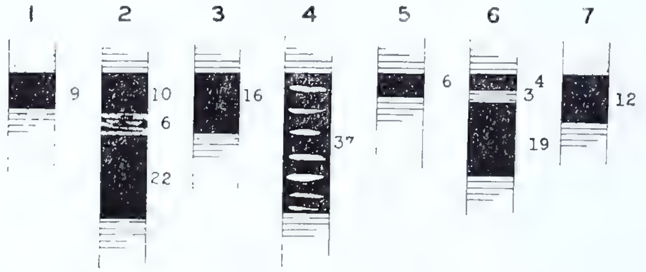


Figure 37. Sections of Clarion coal in Cambria County.

1. Outcrop near Weber, Black Lick township.
2. Outcrop near Big Bend, Black Lick township.
3. Outcrop at Brick Plant, Coopersdale, West Taylor township.
4. Outcrop at Johnstown.
5. Outcrop at South Fork, Croyle township.
6. Outcrop on Bens Creek, Washington township.
7. Outcrop west of Bennington, Gallitzin township.

A local coal 14 feet above the Lower Kittanning has been mined on Bens Creek. Drill hole records in this region indicate that it is a persistent bed, having an average thickness of 2 feet 6 inches. It has more ash than other coals of the same region; otherwise its quality is the same.

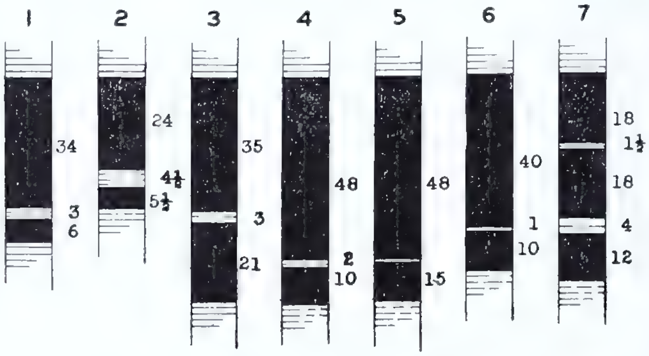


Figure 38. Sections of Bens Creek coal in Cambria County.

1. Piper mine, on Bens Creek.
2. Outcrop, ¼ mile south of Piper mine.
3. Outcrop, 1¼ miles south of Piper mine.
4. Bens Creek Collieries, Inc. Bens Creek Mine No. 2, 1¼ miles southeast of Bens Creek, Washington township.
5. Juniata Coal Co. Juniata No. 2 mine, ½ mile southeast of Myra, Portage township.
6. Juniata Coal Co. Juniata No. 3 mine, 1 mile southeast of Myra, Portage township.
7. John Harris & Sons. Harris No. 2 mine, on Bear Rock Run, 2 miles southeast of Lilly.

The Middle Kittanning coal is found at many places from 25 to 35 feet above the Lower Kittanning bed. In this county it is unimportant and of poor quality.

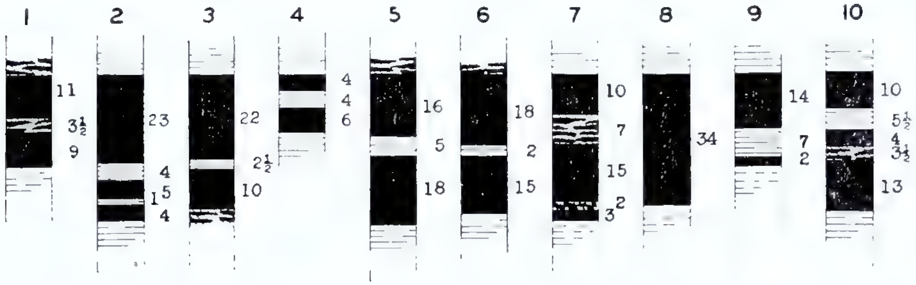


Figure 39. Sections of Middle Kittanning coal in Cambria County.

1. Outcrop on headwaters of Solomons Run, Stony Creek.
2. Outcrop at Johnstown.
3. Outcrop at Coopersdale, West Taylor township.
4. Outcrop 1 mile east of Vintondale, Jackson township.
5. Outcrop on Blacklick Creek at Weber, Blacklick township.
6. Nantyglo Smokeless Coal Co. Nantyglo Smokeless No. 1 mine, ½ mile south of Nantyglo station, Jackson township.
7. Outcrop on Brubaker Run, 1½ mile north of Hastings, Elder township.
8. Northern Cambria Coal Co. Northern Cambria No. 1 mine, 1 mile north of Frugality station, Reade township.
9. Outcrop on Clearfield Creek at Fallen Timber, White township.
10. Drill record, center of Wilmore Basin, Adams township.

Numerous small beds of unminable coal in the Conemaugh group are scattered through 700 to 900 feet of strata above the Upper Freeport bed.

The Mahoning coal lies about 45 feet above the Upper Freeport coal and between the lower and upper parts of the Mahoning sandstone. The coal itself is not valuable, but the iron ore and clays associated with it are sometimes worth exploitation.

The Brush Creek or Gallitzin coal, lying 70 to 110 feet above the Upper Freeport coal, never exceeds 12 inches in thickness and is unminable.

The Bakerstown coal is an unminable bed lying some 225 feet above the Upper Freeport coal.

The Harlem coal lies from 300 to 400 feet above the Upper Freeport coal. It has been mined as custom coal in one locality. The bed is very thin, but it is reported to be a good smithing coal.

Many other beds only a few inches thick will not be mentioned in this report.

An impure coal lying about 775 feet above the Upper Freeport and having an average thickness of less than 2 feet in a very small acreage on a knob 2 miles south of Wilmore, has been correlated as the eastern remnant of the Pittsburgh coal in Cambria County. The coal has been mined but is of little value.

For the discussion of the commercial coal beds, the text matter is based upon hundreds of measurements of the coal beds. This discussion is intentionally brief. The sections accompanying the text are very complete and illustrate fully the physical character of the coal beds.

Lower Kittanning (B) Coal.

The Lower Kittanning coal is the highest grade, most important, and most persistent coal in the Johnstown-South Fork-Windber district. At Johnstown the coal is at or below drainage level and is mined by shaft or slope. Laurel Hill anticline and Ebensburg anticline bring it to crop at different points along Conemaugh River. The coal is at considerable depth in the Wilmore basin, but in the vicinity of Windber it comes to the surface and is mined by drift.

In the vicinity of Johnstown the coal has a regular thickness of 3 feet 6 inches to 4 feet; the latter is the maximum for the Johnstown basin. A lower bench 6 inches to 2 feet thick, which is not mined, is sometimes present, separated from the top bench by 12 inches of shale. The coal in the lower bench rarely has the good quality of the upper bench.

At South Fork and Mineral Point the main bench is thicker than it is at Johnstown, and averages nearly 4 feet, with a maximum of 5 feet. The lower bench which is also present in this vicinity has a regular thickness of 2 feet, but is seldom mined.

In the Windber region the main bench of the Lower Kittanning coal has practically the same thickness as in the vicinity of Johnstown. In places a rider varying in thickness from 1 to 14 inches occurs 3 feet 6 inches to 4 feet above the main bench; the characteristic lower bench, 3 inches to 2 feet, is present.

The Lower Kittanning coal of this district is high in fixed carbon, low in volatile matter and moisture. In the vicinity of Johnstown the bed has a larger percentage of ash and sulphur than in the South Fork area. The fuel ratio is higher. It is a good steam coal throughout the entire district and has been coked with success in a few localities. The yield of coke is high, but it is also commonly high in sulphur.

The Lower Kittanning coal has been the most important coal in the Portage-Gallitzin district for many years. It has high fixed carbon, medium volatile, low moisture, and medium ash and sulphur content. It is greatly in demand as a high-grade locomotive steam coal. In the vicinity of Lilly it is mined and shipped as a smithing coal. It is equal in quality to the Lower Freeport bed of the Friedens district in Somerset County, the standard smithing coal in central Pennsylvania. The bed is a single bench, though locally a thin unminable lower bench comes in, separated from the main bench by a shale parting about 3 inches thick. The main bench averages over 3 feet 6 inches thick, with no well-defined partings or binders. The bed is very thick, regular, and free from rock rolls.

The Lower Kittanning bed outcrops in the valley of Clearfield Creek and its tributaries and on the western slope of the Allegheny Front. It has been opened and developed at many places from Daugherty to the north line of the county. The bed ranges from 1 to 4 feet and is divided into an upper and lower bench by a characteristic binder. Where the lower bench has considerable thickness, the whole bed is mined and the parting of 2 to 5 inches of bone is picked out before shipment. Where the lower bench is thin the upper bench forms the main part of the bed. The binder is then used as the bottom and the lower bench is not mined. The coal is fairly clean and the sulphur content is low; the ash is medium. This coal is used successfully as a steam coal. The bed is subject to local rolls both on roof and bottom, and to pinches and swamps, which cause great variation in thickness.

The Lower Kittanning is very regular throughout the Barnesboro-Patton area, averaging 3 to 4 feet thick with one or two benches below, which locally can be worked with the main bench. The principal outcrops are in the valley of Clearfield Creek south of Coalport, in the valley of Chest Creek between Patton and Altburn, and on the headwaters of West Branch of the Susquehanna. In the vicinity of Delaney the bed is split into two benches by 12 inches of bone and shale; the top bench is 2 feet 6 inches thick, and the lower one 12 inches thick. At Bakerton the bed is 6 feet 10 inches thick, and is parted by shale into three benches. The top of the main bench of good clean coal is 3 feet 10 inches thick. A 6-inch middle bench is separated from the top bench by 6 inches of shale. The lower bench is 14 inches thick, with 4 inches of shale between it and the middle bench. In the Clearfield Creek region the bed is divided by a bony parting into a top bench 17 inches thick and a lower one 2 feet 6 inches thick. The lower bench also carries a small bony parting 13 inches from the bottom. At St. Benedict the coal is 2 feet 8 inches thick with 18 inches of bony coal on top. This bed is regarded as one of the most valuable coals in the northern part of the county. A large area of the coal lies at considerable depth, and remains practically untouched, since coals more easily reached for mining have had the preference. Its reputation as a superior steam coal indicates a large future production. It has a slightly higher sulphur content than the Lower Freeport coal of the same region, but it has less ash. The Lower Kittanning coal is not used alone for making coke, but when mixed with the Lower Freeport it gives a calculated coke value of 77 per cent.

The Lower Kittanning is by far the most important bed in the Black Lick district. The coal is mined, mainly by drift, from Vinton dale, where it first outcrops, eastward to Nanty-Glo and on the tributaries of Blacklick Creek. Enormous areas in Barr, Cambria, and Carroll townships, where the coal is deep, are undeveloped and have been prospected but little by core drill. It is hard to estimate the worth of this potential coal field at the present, but it probably contains large acreages of excellent coal. The Lower Kittanning coal closely resembles the same bed on Conemaugh River in its mode of occurrence and physical characteristics. The top or main bench averages from 3 feet 6 inches to 4 feet thick over the entire district. A thin shale parting separates it from a thin middle bench, averaging less than 5 inches thick. The lower bench is separated from the middle bench by a shale parting never exceeding 2 or 3 inches thick. The lower bench has a maximum thickness of 2 feet and averages about 18 inches. The lower bench is inclined to be high in ash and sulphur and is not mined unless it is of unusual thickness. The top or main bench is a bright and lustrous coal, with columnar cleavage, and mines out in large lumps. The coal has a very uniform analysis over the entire district. The moisture is low; volatile matter also is low and fixed carbon averages around 70 per cent. The ash varies but is low in almost every analysis. The sulphur content is rather high. Steaming tests made by the United States Geological Survey have shown it to be a high class steam coal. The coal makes a light gray, silvery coke that is sometimes soft and high in sulphur. It has been coked successfully in several localities in both beehive and by-product ovens.

The following sections are typical of the Lower Kittanning in Cambria County:

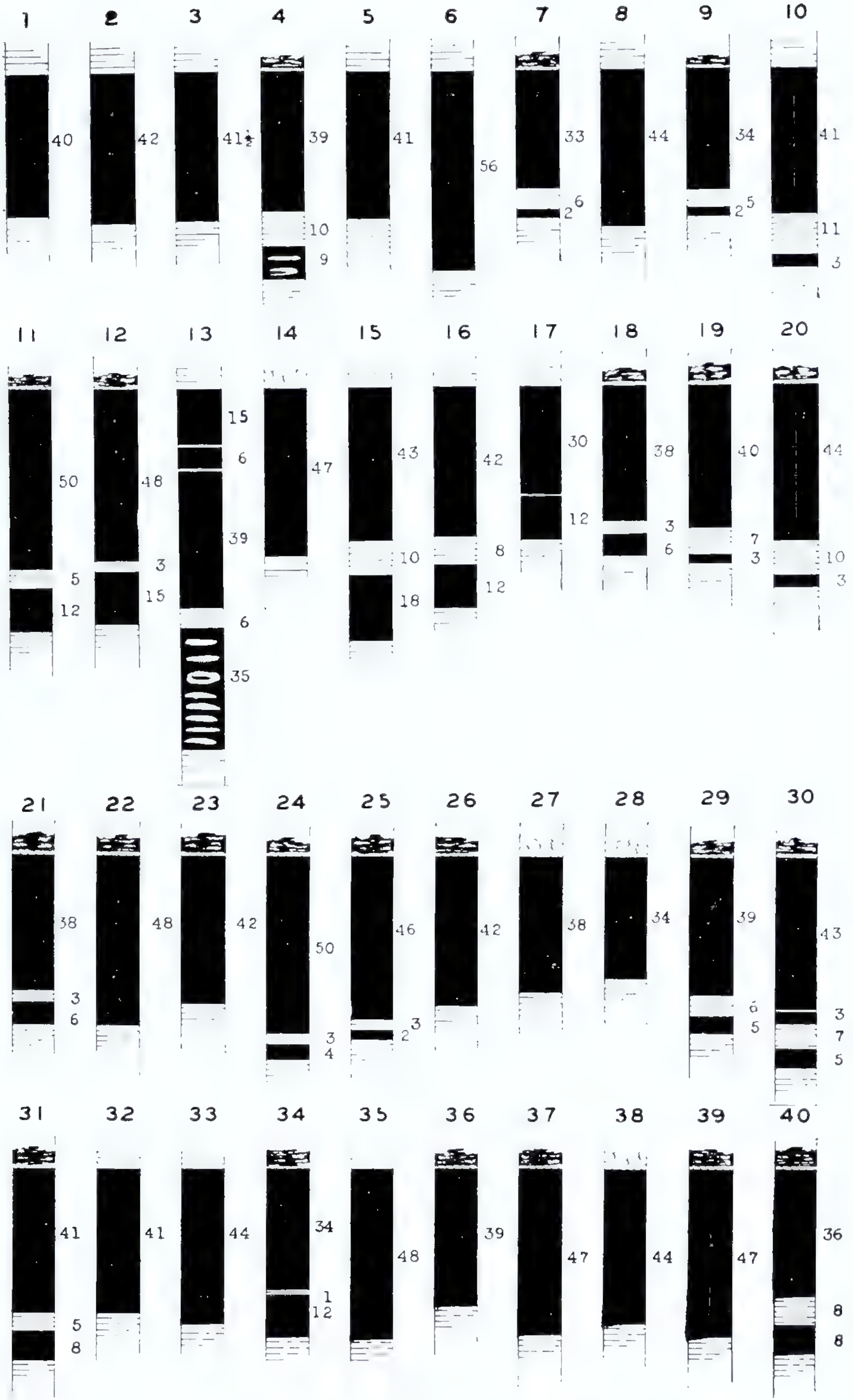


Figure 40. Sections of Lower Kittanning coal in Cambria County.

1. McCrory Coal Company. D Street shaft, at D Street, ⅕ mile south of Johnstown, City Line, Lower Yoder township.
2. Piney Run Mining Company. Morrellville No. 1 mine, at Morrellville, Lower Yoder township.
3. George W. Griffith. St. Clair mine, on St. Clair Run ¾ mile south of Morrellville, Lower Yoder township.
4. Valley Smokeless Coal Company. Valley Smokeless No. 4 mine, at Krings Station, Stony Creek township.
5. Valley Smokeless Coal Company. Valley No. 3 mine, on Stony Creek, at Riverside, Stony Creek township.
6. Berwind-White Coal Mining Company. Mine No. 37, 1 mile northwest of Scalp Level, Richland township.
7. Citizens Coal Company. Green Hill mine, City of Johnstown, ¼ mile east of City Building.
8. Johnstown Smokeless Coal Company. Haws Shaft, in Johnstown City, ¼ mile west of P. R. R. Station.
9. Citizens Coal Company. Gautier mine, in Johnstown City, ¼ mile northeast of City Building.
10. Hiram Swank's Sons. Woodvale No. 1, on east Johnstown City line.
11. Bethlehem Mines Corp. Mine No. 74, in Franklin Borough.
12. Mineral Point Coal Company. Smokeless No. 3 mine, 1 mile southwest of Mineral Point, Conemaugh township.
13. James A. Page & Son. Page mine, ⅓ mile south of Mineral Point, Conemaugh township.
14. Argyle Coal Company. Argyle No. 2 mine, 1½ miles northwest of South Fork, East Taylor township.
15. Conemaugh Coal Mining Company. Park Hill mine, ¾ mile northeast of Conemaugh Station, East Taylor township.
16. Bethlehem Mines Corp. Mine No. 72, at Rosedale, East Taylor township.
17. Johnstown Smokeless Coal Company. Mine No. 7, at the confluence of Laurel Run with Conemaugh River, West Taylor township.
18. Lochrie Coal Company. Scalp Level No. 2 shaft, 1 mile south of Llanfair, Adams township.
19. Logan Coal Company. Logan No. 1 mine, east of Yellow Run at south line of Dunlo town, Adams township.
20. Mountain Coal Company. Yellow Run mine, ¼ mile north of Railroad Station, Dunlo, Adams township.
21. Henriette Coal Mining Company. Henriette No. 2 mine, 1½ miles southwest of P. R. R. Station, Dunlo, Adams township.
22. Maryland Coal Company of Pennsylvania. Maryland shaft, on the south fork of Conemaugh River, 2½ miles southeast of South Fork town, Adams township.
23. Stineman Coal & Coke Company. Stineman No. 4 mine, ¼ mile southwest of South Fork, Adams township.
24. Stineman Coal & Coke Company. Stineman mine, ½ mile west of South Fork, Conemaugh township.
25. Burkett Coal Company. Stineman No. 9 mine, in South Fork Boro.
26. Argyle Coal Company. Argyle mine No. 1, ½ mile west of South Fork Station, Croyle township.
27. Priscilla Coal Mining Company. Priscilla No. 1 mine, at South Fork Station, Crayle township.
28. Sunshine Coal Mining Company. Stineman No. 8 mine, ½ mile east of South Fork Station, Croyle township.
29. Loyalhanna Coal & Coke Company. Loyal Hanna No. 3 mine, 1 mile southeast of Beaverdale Station, Summerhill township.
30. Logan Coal Company. Logan No. 2 mine, ¼ mile southeast of Beaverdale Station, Summerhill township.
31. Logan Coal Company. Logan No. 4 mine, at Beaverdale Station, Summerhill township.
32. W. H. Hughes & Company. Hughes No. 3 mine, ½ mile south of Martindale, Portage township.
33. Thermal Smokeless Coal Company. Thermal No. 1 mine, at Martindale, Portage township.
34. Shoemaker Coal mining Company. Miller Slope mine, between Puritan and Martindale, Portage township.
35. Forge Coal Mining Company. Forge No. 2 mine, at Puritan, Portage township.
36. Sonoman Shaft Coal Company. Sonoman shaft, at Sonoman, Portage township.
37. Pennsylvania Coal & Coke Corporation. Pennsylvania No. 1 mine, 1¼ miles southeast of Cassandra, Portage township.
38. C. A. Hughes & Company. Hughes No. 2 mine, 1 mile southeast of Bens Creek, Washington township.
39. Bear Rock Coal Company. Bear Rock Colliery No. 2, ½ mile south of Bens Creek, Washington township.

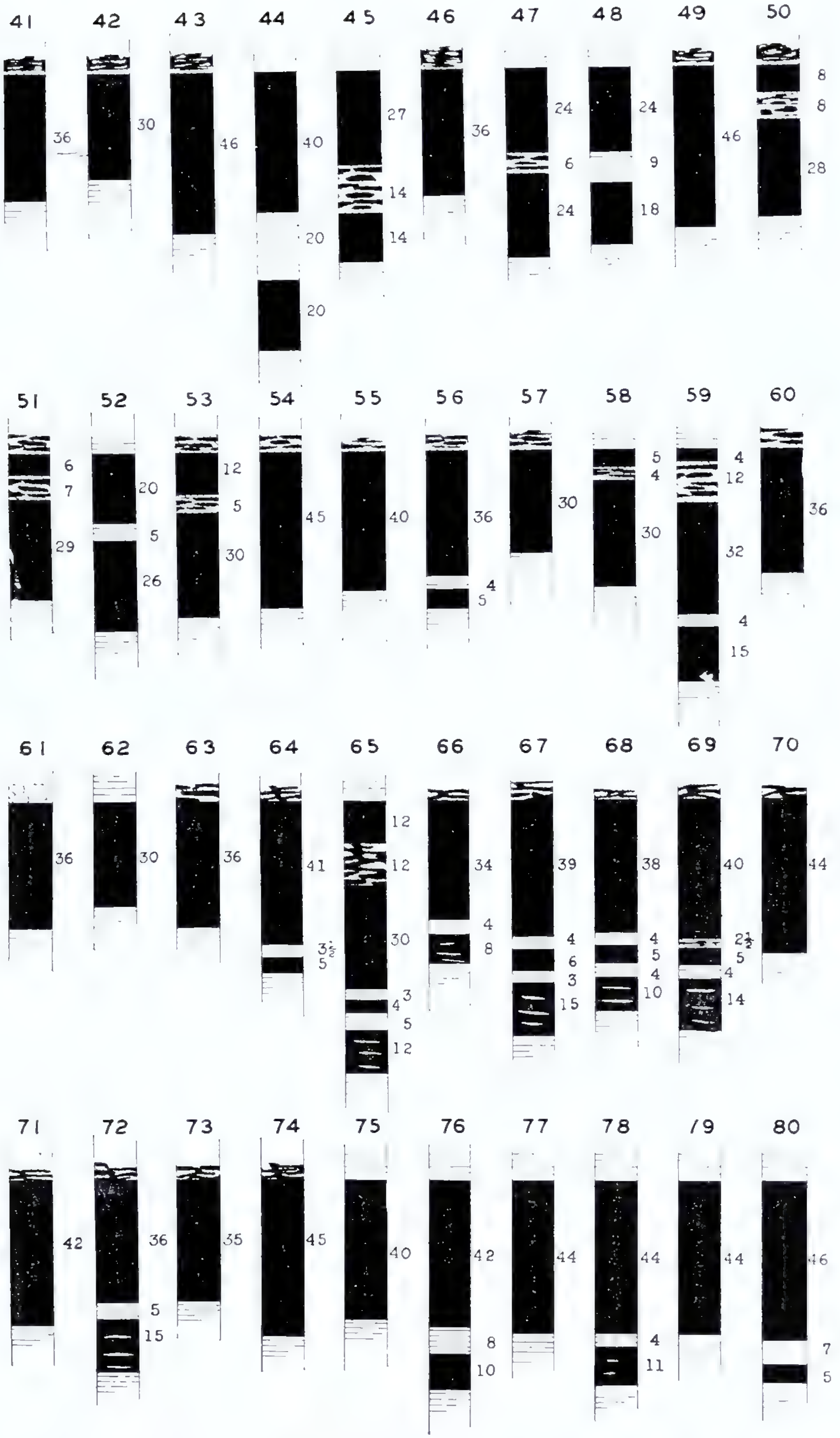


Figure 41. Sections of Lower Kittanning coal in Cambria County.

40. W. H. Piper & Company. Sonoman No. 2 mine, at Lilly, Washington township.
41. Standard Coal Company. Standard No. 1 mine, 1 mile southeast of Lilly, Washington township.
42. Pennsylvania Coal & Coke Corp. Pennsylvania No. 9B mine, 1 mile northeast of Cresson, Cresson township.
43. Sugar Run Coal Mining Company. Dysart No. 1 mine, 1 mile east of Dysart station, Dean township.
44. Laurel Run Coal Mining Company. Laurel Run No. 2 mine, 1 mile south of Dean Station, Dean township.
45. F. A. Garman. Garman No. 3 mine, at Daugherty, Dean township.
46. Great Bend Coal Company. Great Bend mine, at Mountaindale, Reade township.
47. Figart Run Coal Company. Fricks mine, 1 mile southwest of Blandburg, Reade township.
48. Bellefield Coal & Coke Company. Bend No. 5 mine, 1 mile southwest of Figart Station, Reade township.
49. Fred Bland, Jr. Bland No. 1 mine, at Blandburg, Reade township.
50. Garman Bros. Garman mine, at Blandburg, Reade township.
51. Glasgow Coal Mining Company. Miller No. 1 mine, at Glasgow, Reade township.
52. Jasahill Coal Mining Company. Rebecca No. 1 mine, ½ mile east of Flinton Station, Reade township.
53. Cambria & Moshannon Coal Company. Cammos No. 7 mine, ½ mile north of Mountaindale, Reade township.
54. Pine Valley Coal Company. Pine Valley No. 1 mine, 1 mile northwest of Aldburn, Elder township.
55. Miller Run Coal Company. Miller Run No. 1 mine, 2½ miles northeast of Hastings, Elder township.
56. Red Top Coal Company. Red Top mine, 1 mile northeast of Hastings, Eider township.
57. Pennsylvania Coal & Coke Corporation. Pennsylvania No. 13 mine. 1 mile northeast of Hastings, Elder township.
58. Pennsylvania Coal & Coke Corp. Pennsylvania No. 36 mine, 1 mile northwest of Patton, on left bank of Chest Creek, Elder township.
59. Carrolltown Coal Company. Victor No. 9 mine, ½ mile south of Spangler, Susquehanna township.
60. Madeira Hill Coal Mining Company. Spangler No. 4 mine, in Barnesboro Borough.
61. Cymbria Coal Company. Cymbria Shaft No. 3, at Cambria, Susquehanna township.
62. Barnes & Tucker Company. No. 17 slope, at North Barnesboro, Susquehanna township.
63. Jos. H. Reilly Coal Company. Reilly Shaft No. 1, ½ mile south of Spangler Station, Barr township.
64. Pennsylvania Coal & Coke Corporation. Pennsylvania No. 18, 2 miles southeast of Spangler Station, Barr township.
65. Carrolltown Coal Company. Victor No. 10 mine, ½ mile west of Benedict, Carroll township.
66. Sterling Coal Company, Sterling No. 3 mine, ½ mile north of Bakerton Station, Carroll township.
67. Binder Coal Mining Company. Binder No. 1 mine, 2 miles southeast of Spangler Boro., Carroll township.
68. Barnes Coal Company. Lancashire mine No. 14, ½ mile northwest of Bakerton Station, Carroll township.
69. Sterling Coal Company. Sterling No. 1 mine, ½ mile west of Bakerton Station, Carroll township.
70. Heisley Coal Company. Heisley No. 2 mine, at Bakerton, Carroll township.
71. Sterling Coal Company. Sterling No. 6 mine, ½ mile southwest of Elmora, Carroll township.
72. Bakerton Coal Company. Bakerton No. 1 mine, at Carrolltown Roads, Carroll township.
73. Ebensburg Coal Company. Ebensburg No. 1 mine, at junction of Barr, Cambria and Blacklick townships.
74. Monroe Coal Mining Company. Revloc No. 1 mine, at Beulah Station, 2 miles northwest of Ebensburg, Cambria township.
75. Vinton Colliery Company. Vinton No. 6 mine, ¼ mile east of Vintondale Station, Jackson township.
76. Commercial Coal Mining Company. Commercial No. 5 mine, 1½ miles north of Rexis, Blacklick township.
77. Big Bend Coal Mining Company. Nonpareil No. 1 mine, at Twin Rocks, Blacklick township.
78. Commercial Coal Mining Company. Commercial No. 3 mine, ½ mile west of Twin Rocks, Blacklick township.
79. Commercial Coal Mining Company. Commercial No. 5 mine, 1 mile northeast of Twin Rocks, Blacklick township.
80. Imperial Cardiff Coal Company. Cardiff No. 1 mine, 2½ miles north of Nantyglo, Blacklick township.

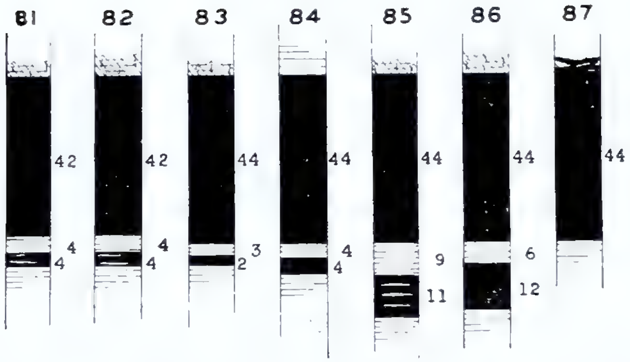


Figure 42. Sections of Lower Kittanning coal in Cambria County.

81. Warren Collieries Company. Cardiff No. 6 mine, 1½ miles east of Twin Rocks, Blacklick township.
82. Warren Collieries Company. Elizabeth No. 1 mine, 1½ miles north of Nantyglo, Blacklick township.
83. Lincoln Coal Company. Lincoln No. 1 mine, 1½ miles north of Nantyglo, Blacklick township.
84. Springfield Coal Company. Springfield No. 3 mine, ⅓ mile east of Nantyglo Station, Blacklick township.
85. Heisley Coal Company. Heisley No. 1 mine, ¾ mile south of Nantyglo Station, Blacklick township.
86. Jackson Coal Mining Company. Jackson No. 1 mine, ⅓ mile south of Twin Rocks Station, Jackson township.
87. Chickaree Coal Company. Chickaree No. 1 mine, on William Penn Highway, 3 miles southeast of Vintondale, Jackson township.

UPPER KITTANNING (C′) COAL.

The Upper Kittanning coal also is important in the Johnstown-South Fork-Windber district. It is best in the vicinity of Johnstown, where its reputation as a steam coal is equal to, if not better than, that of the Lower Kittanning. Although its development is of more recent date than the latter bed, the Upper Kittanning coal furnishes a large percentage of the production in this district. Analyses show a high percentage of fixed carbon, and low content of volatile matter and moisture. The percentage of ash and sulphur is rather high.

The Upper Kittanning varies much in thickness in the area around Johnstown. The minimum is 2 feet 6 inches, the maximum 6 feet. The greatest thickness is along Stony Creek and in the Windber area. A local bony coal at the top and local knife blades of pyrite are the only marked impurities.

Along Conemaugh River the coal is thinner but it has less sulphur and ash than in the Johnstown region.

The Upper Kittanning coal is not mined much in the Windber area where the importance of the Lower Kittanning coal has overshadowed it. Prospecting indicates that the bed averages between 3 and 4 feet thick. It retains its good quality and is marked by the absence of impurities.

The Upper Kttanning bed is not important in the Portage-Gallitzin district. Although the coal compares favorably in composition with the Lower Kittanning, the ash and sulphur content is slightly higher. The mining of this bed is limited and cannot be expected to increase much in the future. The coal shows great variation in thickness and quality. In large areas the bed does not exceed 12 inches in thickness, and averages less than 2 feet. The coal is in one bench.

The Upper Kittanning is also important in the mountain district. It has been developed extensively at Daugherty, Lloydsville, and Blandburg. The coal has no characteristic impurities, although locally the bed is split into two benches by a thick bone parting. In such places the coal beneath the parting is not mined. In many localities the coal is overlain with a few inches of draw slate, which is taken down in the rooms and headings for height. The bed varies much in thickness and quality. Its average thickness does not exceed 2 feet 6 inches. The coal does not rank with the Lower Kittanning in quality because iron pyrite makes the sulphur content very high. The ash is medium. Tests have shown that it is a very good steam coal, but is inclined to make large clinkers.

The Upper Kittanning outcrops on Chest Creek and Brubaker Run north of Patton and Hastings, and along the valley of West Branch of the Susquehanna River. It is mined by drift and slope openings, chiefly in the vicinity of Patton and Hastings. Many country banks have been opened on Chest Creek and West Branch of the Susquehanna and their tributaries to supply house fuel. The coal locally has a maximum thickness of 5 feet, but the lower part is so cut by shale and bone partings that it is not mined. The average thickness of good coal is 3 feet 7 inches. In some places knife blades of sulphur are abundant and are the only impurity. The coal remains untested in large areas and it is impossible to state accurately its commercial value. It is safe to say, however, that the Upper Kittanning coal cannot be expected to have the excellent quality of the other beds now being mined in the district. After these beds have been exhausted, profitable production of the Upper Kittanning may be expected if the coal is picked and washed, for it is a good steam coal. No coking tests have been made on it.

The following sections are typical of the Upper Kittanning in Cambria County:

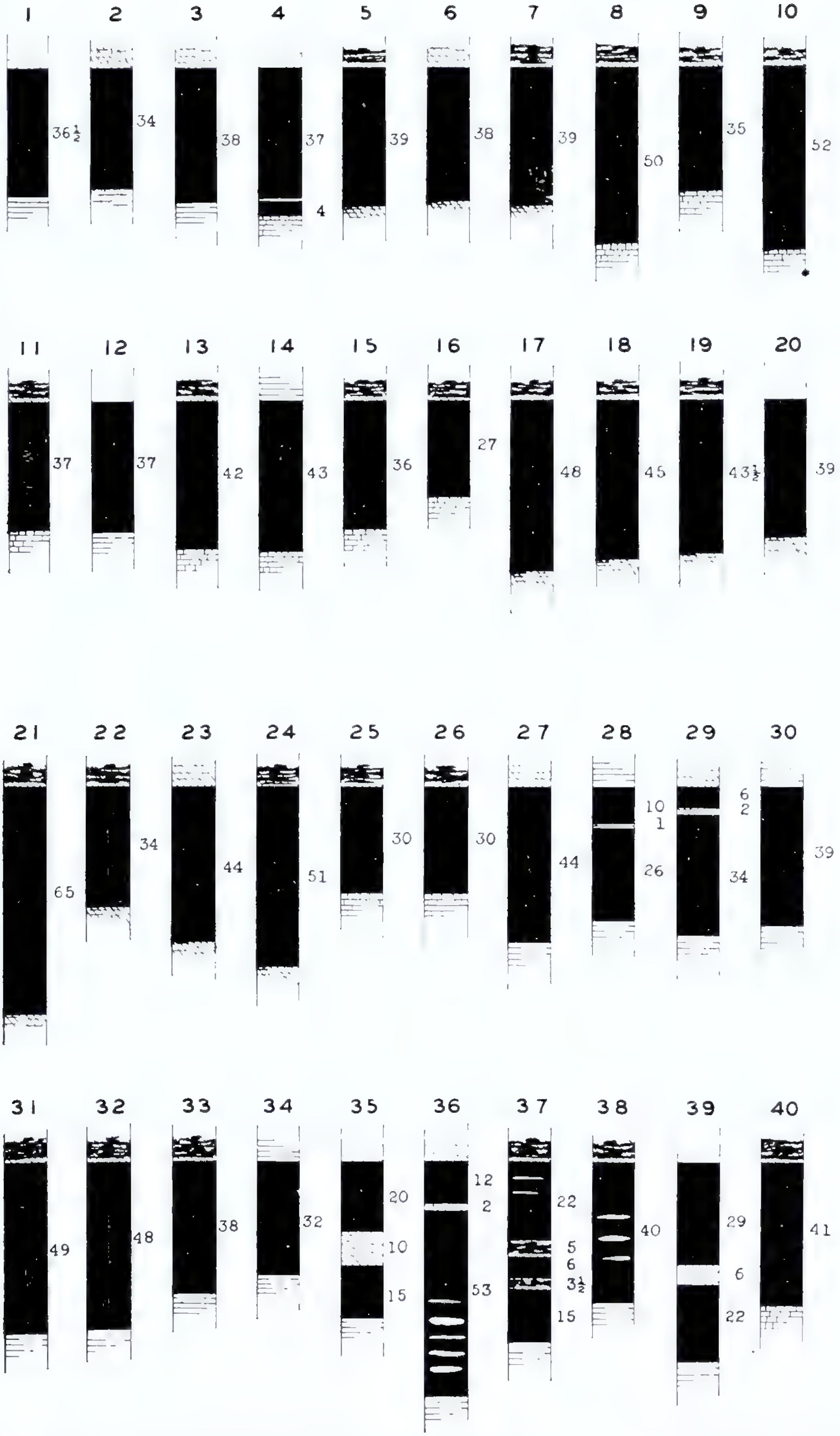


Figure 43. Sections of Upper Kittanning coal in Cambria County.

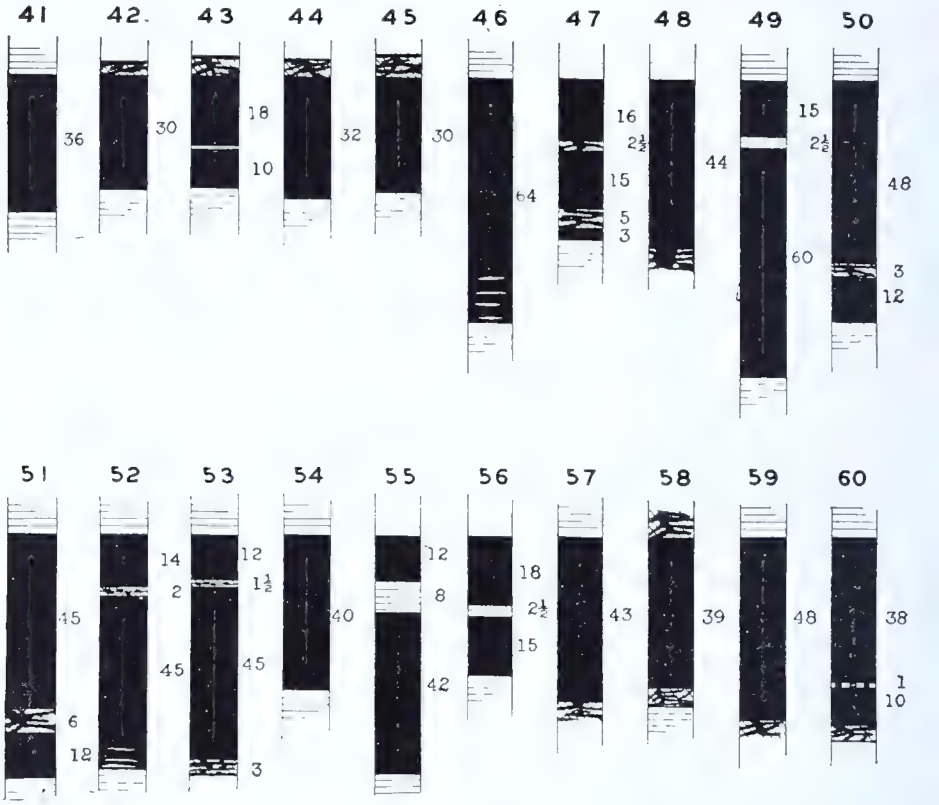


Figure 44. Sections of Upper Kittanning coal in Cambria County

1. Piney Run Mining Co. Morrellville No. 5 mine at Morrellville, Lower Yode township.
2. Benshoff Coal Co. Benshoff mine at D Street, $\frac{1}{5}$ mile south of Johnstow City line.
3. Brookdale Coal Co. Gillen No. 2 mine at Brookdale station, East Taylo township.
4. Park Hill Coal Co. Echo mine, $\frac{3}{4}$ mile northeast of Conemaugh station, Eas Taylor township.
5. Highland Coal Co. Highland mine, in Lorain boro.
6. Ideal Coal Co. Thermal No. 5 mine in Johnstown City at Ash and McMiller Streets.
7. Moxham Coal Co. Thermal No. 4 mine, in Johnstown, Grove Avenue.
8. Smokeless Coal Co. Smokeless Nos. 1 and 3 mines, in Ferndale boro.
9. Penelec Coal Corporation. Penelec No. 1 mine, $\frac{3}{4}$ mile south of City Building, Johnstown.
10. Bethlehem Mines Corp. No. 71 mine, Westmont boro.
11. Huber Street Coal Co. Huber Street mine, $\frac{1}{2}$ mile east of Pennsylvania railroad station, Johnstown.
12. Bethlehem Mines Corp. Mine No. 73, in Franklin boro.
13. Mineral Point Coal Co. Smokeless No. 4 mine, 1 mile west of Mineral Point, Conemaugh township.
14. S. S. Seese. Seese No. 6 mine, $\frac{1}{4}$ mile south of Mineral Point, Conemaugh township.
15. Forks Coal Co. Hughes No. 12 mine, $\frac{1}{4}$ mile south of Pennsylvania station, South Fork, Conemaugh township.
16. H. C. Stineman Coal Co. Stineman No. 5 mine, in South Fork boro.
17. Tunnel Smokeless Coal Co. Hillside mine, at Hog Back tunnel, Stony Creek township.
18. Valley Smokeless Coal Co. Valley No. 1 mine, Johnstown, near southern city limits.
19. Rocky Creek Coal Co. Rocky Creek mine, 1 mile east of Lorain boro, Stony Creek township.

20. Solomon Run Coal Co. Solomon Run No. 2 mine, 1½ miles northeast of Johnstown, Stony Creek township.
21. Lorain Steel Co. Ingleside mine, 2 miles southeast of Krings station, Richland township.
22. Cambria-Lochrie Coal Co. Cambria-Lochrie No. 2 mine, 1½ miles southeast of Johnstown, Richland township.
23. Sheesley Coal Co. Sheesley mine, 1¾ miles northeast of Johnstown, on Solomon Run road, Richland township.
24. Berwind-White Coal Mining Co. Eureka No. 37 Upper mine, ½ mile north of Scalp Level. Richland township.
25. Riverside Coal Mining Co. Mine No. 2, at South Fork, Adams township.
26. Forks Coal Co. Bituminous No. 1 mine, ½ mile southeast of South Fork, Croyle township.
27. W. H. Hughes & Co. Hughes No. 4 mine, 2 miles southeast of Martindale, Portage township.
28. Portage-Wilmore Coal Co. Sherbine No. 1 mine, at Martindale, Portage township.
29. Pearce Coal Mining Co. Excelsior No. 1 mine, near Puritan, Portage township.
30. Plymouth Coal Mining Co. Plymouth mine, at Puritan, Portage township.
31. Forge Coal Mining Co. Forge Slope No. 1 mine, at Puritan, Portage township.
32. Portage Coal Mining Co. Portage No. 2 mine, 1¼ miles southeast of Portage. Portage township.
33. Sonman Shaft Coal Company. Sonman Shaft, at Sonman, Portage township.
34. W. H. Hughes & Co. Lilly No. 2 mine, on Bear Rock Run, 1¼ miles southeast of Lilly, Washington township.
35. Richland Coal Co. Richland No. 1 mine, 1 mile southwest of Daugherty, Dean township.
36. James C. Stineman Coal Co. Stineman No. 12 mine, ½ mile northeast of Dean station, Dean township.
37. Reorganization Committee of Eastern Bituminous Coal Mining Bonds. Dean No. 10 mine, 1½ miles south of Frugality station, Dean township.
38. Big Four Coal Co. Christine No. 1 mine, 1½ miles south of Dysart station, Dean township.
39. Montvale Coal Co. Montvale mine at Daugherty, Dean township.
40. Beacon Coal Co. Peerless No. 5 mine, ½ mile southeast of Van Ormer, Reade township.
41. G. C. Bland & Bros. Coal Co. Bland No. 4 mine, 1½ miles northeast of Van Ormer, Reade township.
42. L. B. Bland. Bland Colliery No. 3, at Lloydville, Reade township.
43. Fred Bland, Jr. Long Chute No. 2 mine, ¼ mile south of Figart station, Reade township.
44. Big Point Coal Co. Big Point No. 2 mine, at Blandburg, Reade township.
45. Tyrone Fuel and Supply Co. Miller Bros. No. 1 mine, at Mountaindale, Reade township.
46. Thomas Ridge Coal Co. Thomas Mills No. 1 mine, at Thomas Mills, Chest township.
47. Pennsylvania Coal & Coke Corp. Pennsylvania No. 33 mine, 1¼ miles north of Patton, on right bank of Chest Creek.
48. Pennsylvania Coal & Coke Corp. Pennsylvania No. 37 mine, 1¼ miles north of Patton, Chest township.
49. Huether Coal Co. Huether mine, in Hastings boro.
50. Pennsylvania Coal & Coke Corporation. Pennsylvania No. 29 mine, at St. Bonifacius, Elder township.
51. Pennsylvania Coal & Coke Corporation. Pennsylvania No. 30 mine, 1 mile northwest of Patton, on left bank of Flannagan Run, Elder township.
52. Hastings, 1 mile north of Elder township.
53. Hastings, Elder township.
54. Empire Coal Mining Co. Empire "G" mine, 2 miles north of Barnesboro, Susquehanna township.
55. Oak Ridge Coal & Coke Co. Oak Ridge No. 6 mine, ½ mile south of Hastings, Susquehanna township.
56. Barnes & Tucker Co. Lancashire Mine No. 16, in Barnesboro boro.
57. Pennsylvania Coal & Coke Corp. Pennsylvania No. 39 mine, on right bank of Little Chest Creek, 1 mile west of Patton, East Carroll township.
58. Pennsylvania Coal & Coke Corp. Pennsylvania No. 28 mine, 1½ miles southwest of Patton, on Dry Run, East Carroll township.
59. Patton, ¼ mile south of East Carroll township.
60. Bore hole at Carrolltown, East Carroll township.

LOWER FREEPORT (D) COAL.

At the present time the Lower Freeport coal is not mined extensively in the Johnstown—South Fork—Windber district although the analyses compare favorably with those from the Lower Kittanning. The coal has a high percentage of fixed carbon, low volatile and low moisture content; sulphur and ash are rather high. The bed varies in thickness and locally a few inches of bony coal comes in at the top. In the immediate vicinity of Johnstown the coal has no commercial importance at present but at South Fork it is locally workable. Here the bed is split into two benches by a thin bone parting. It does not exceed 2 feet 6 inches thick.

South of Johnstown on Stony Creek the bed is persistent and workable, averaging about 2 feet 6 inches thick. It is divided into three benches. A top bench, averaging 12 inches thick, is separated by a shale or bone parting from the main bench, averaging 2 feet thick. The lower bench is never minable.

The Lower Freeport bed is also unimportant in the Portage—Gallitzin district. The outcrop and drill records indicate that it is workable in very few localities, although its entire area has not been tested by drill. A few mines have been opened in this bed in the vicinity of Portage where it has a maximum thickness of 2 feet. Numerous bony partings are present in places, and locally a draw slate comes in above the coal. This coal has the same percentage of fixed carbon and volatile matter as the other coals of the district, but is very high in ash and rather high in sulphur.

The Lower Freeport bed is thin and unimportant in most of the Mountain district. Its average thickness is less than 2 feet and its maximum thickness as observed by the writer does not exceed 2 feet 8 inches. The upper part is much cut by bone and shale partings. Numerous roof rolls cause much variation in thickness. Many mushroom mines opened during war time are now abandoned. A large future production cannot be predicted from this bed.

The Lower Freeport is the largest producer in the Barnesboro-Patton district, and in many localities it is fast becoming exhausted. The most extensive development is along West Branch, on Chest Creek, and on Brubaker Run. It has been mined for many years by drift in the vicinity of Barnesboro, Spangler, Elmora, Moss Creek, Carrolltown, St. Bonifacius, and Hastings. The coal is from 3 feet $1\frac{1}{2}$ inches to 5 feet 1 inch thick, averaging nearly 4 feet. The areas of thickest coal are in the center of the Barnesboro basin. The coal thins to the south and southwest and loses its importance. A shale binder 1 to 3 inches thick occurs 8 to 12 inches from the bottom. The bed is much cut by clay veins, varying from 1 inch to

1 foot 8 inches in thickness; the clay veins are so numerous in places that mining of coal is unprofitable.

Locally a bone coal comes in between the coal bed and the roof. A local fold makes a disturbed area along West Branch; the coal is crumpled and thin here. The Lower Freeport coal carries a large quantity of pyrite in the form of knife blades and nodules. These impurities appear to decrease westward, where the coal is used extensively for coking. The coal ranks very high in quality, and has a lower sulphur content than any other coal in the district; its ash is also below the average of the other coals.

The correlation of the uppermost coal that is mined on Blacklick Creek is uncertain. The beds are not mined as much here as on the Conemaugh, and therefore are harder to correlate definitely. The interval above the Lower Kittanning coal, which varies from 150 to 165 feet, is taken to indicate, temporarily at least, that the top bed mined is the Lower Freeport coal. The Upper Freeport coal was not recognized. The bed is composed of three benches, having a total average thickness of nearly 3 feet 6 inches. The top bench has an average thickness of nearly 2 feet; the middle bench is generally thin, and is separated by a thin bony parting from a lower bench about 15 inches thick. The benches and partings vary much in thickness. The partings are easily separated from the coal. After the supply of clean and thicker coal in other beds is exhausted, this bed may be of commercial importance.

The following sections are typical of the Lower Freeport in Cambria County:

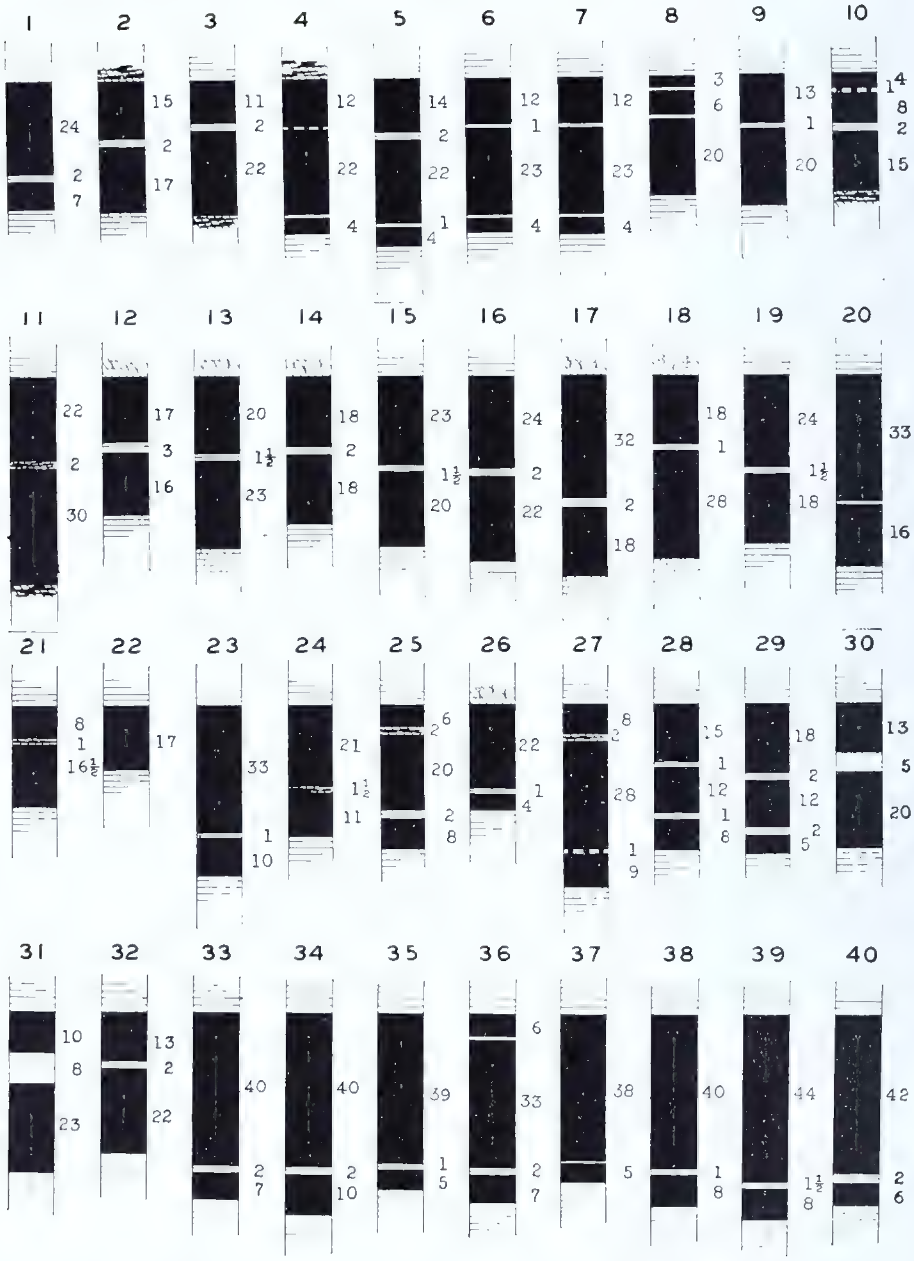


Figure 45. Sections of Lower Freeport coal in Cambria County.

1. Fernhill Coal Company. Fernhill No. 2 mine, ½ mile west of Pennsylvania Station, Johnstown 2.
2. Neel Coal Company. Sheridan No. 2 mine, on Conemaugh River, opposite Cambria, West Taylor township.
3. Liberty Smokeless Coal Company. Liberty mine, in Lorain Boro.
4. Outcrop, between Ferndale & Moxham, Stony Creek township.
5. Outcrop, south of Kernville.
6. On Stony Creek, opposite Lorraine Steel Company plant.
7. Outcrop on Stony Creek, near trolley bridge.
8. Outcrop on Sams Run, Stony Creek township.
9. Outcrop on headwaters of Solomons Run, Richland township.
10. Outcrop at Dale, Stony Creek township.
11. Drill hole record, 2 miles northeast of Windber, Adams township.
12. H. C. Stineman Coal Company. Mine No. 7, on northeastern corner of Conemaugh township.

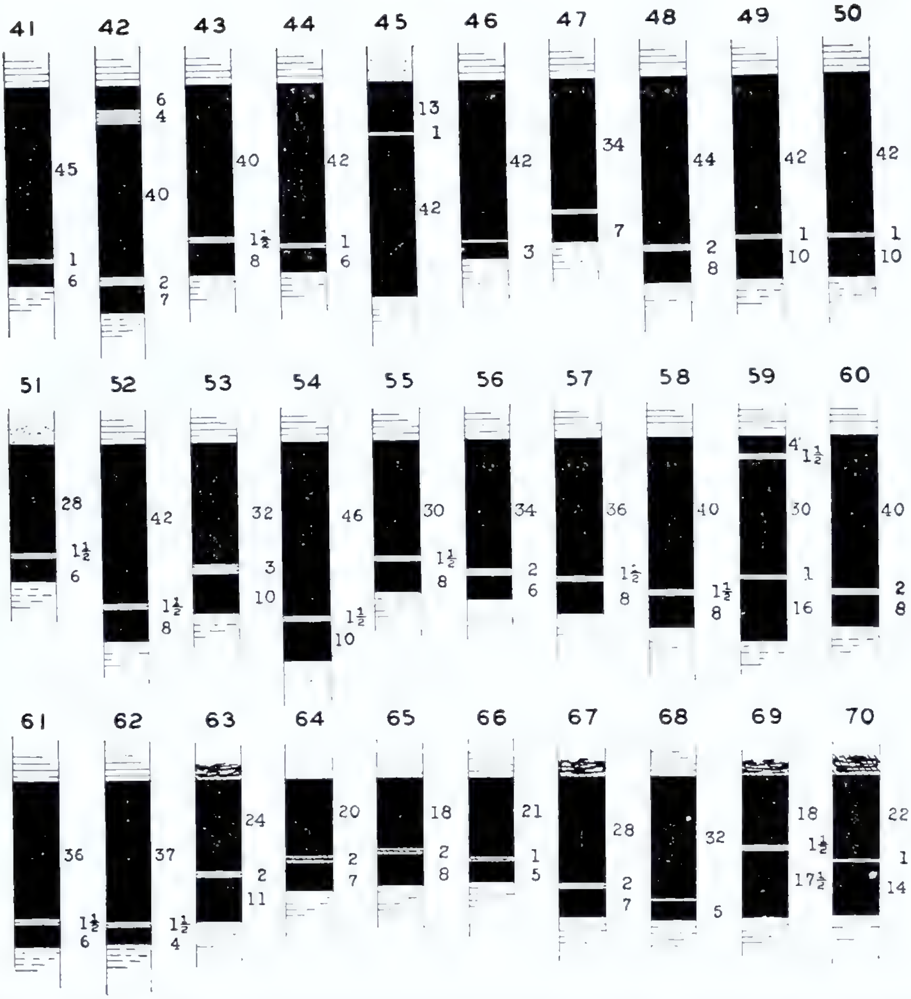


Figure 46. Sections of Lower Freeport coal in Cambria County.

13. Logan Coal Company. Logan No. 8 mine, at Allendale, Adams township.
14. South Fork Colliery Company. Mine No. 3, at south boundary of South Fork Boro, Adams township.
15. South Fork Coal Mining Company. South Fork No. 2 mine, ⅓ mile east of Pennsylvania Railroad Station, South Fork, Croyle township.
16. Pennsylvania Coal & Coke Corporation. Ehrenfeld No. 8 mine, ⅕ mile north of Ehrenfeld, Croyle township.
17. Boucher-Cortright Coal Company. Viking mine, ¼ mile west of Lloydell Station, Summerhill township.
18. Logan Coal Company. Logan No. 6½ mine, west of South Fork Creek at Beaverdale.
19. Beachley Coal Company. Beachley No. 1 mine, at Puritan, Portage township.
20. Sonman Run Coal Company. Sonman Run No. 1 mine, at Sonman, Portage township.
21. On Bens Creek, near Cassandra, Washington township.
22. At Gallitzin, Gallitzin township.
23. Outcrop ½ mile north of Ashville, Clearfield township.
24. Glasgow, country bank, Reade township.
25. Beacon Coal Company. Peerless No. 2 mine, ¼ mile southeast of Van Ormer, Reade township.
26. Fallen Timber Coal Company. Colonial No. 8 mine, at Fallen Timber, Reade township.
27. Country bank, 1½ miles northeast of Van Ormer, Reade township.
28. Reade Coal Company, Inc. Reade No. 1 mine, ¼ mile northeast of Flinton Station, Reade township.
29. Jasahill Coal Mining Company. Rebecca mine, ¼ mile northeast of Flinton Station, Reade township.

30. Holland Coal Company. Hughes No. 5 mine, at Glendale, White township.
31. Strayer Bros. Strayer No. 1 mine, 1 mile southwest of Flinton, White township.
32. Wilmore Basin Coal Company. Wilmore Basin No. 1, 1¼ miles west-southwest of Flinton Station, White township.
33. Rich Hill Coal Company. Rich Hill No. 2 mine, ½ mile north of Hastings, Elder township.
34. Pennsylvania Coal & Coke Corp. Pennsylvania No. 11 mine, 1 mile southeast of Hastings, Elder township.
35. Pennsylvania Coal & Coke Corp. Pennsylvania No. 12 mine, 1¼ miles south-southeast of Hastings, Elder township.
36. Pennsylvania Coal & Coke Corp. Pennsylvania No. 27 mine, at St. Bonifacius, Elder township.
37. Pennsylvania Coal & Coke Corp. Pennsylvania No. 31 mine, 1 mile northwest of Patton, Elder township.
38. Oak Ridge Coal & Coke Company. Oak Ridge No. 1 mine, ½ mile south of Hastings, Susquehanna township.
39. Duncan-Spangler Coal Company. Delta No. 1 mine, 1 mile southeast of Barnesboro, Susquehanna township.
40. Madeira Hill Coal Mining Company. Spangler No. 3½ mine, on head of Walnut Run, 2 miles east of Barnesboro, Susquehanna township.
41. Pennsylvania Coal & Coke Corp. Pennsylvania No. 17D mine, 1¼ miles east of Barnesboro, Susquehanna township.
42. Barnes & Tucker Company. Lancashire No. 12 mine, at North Barnesboro, Susquehanna township.
43. Empire Coal Company. Woodland No. 2 mine, 1 mile northeast of Barnesboro, Susquehanna township.
44. Deringer Bros. Coal Co. Woodland No. 2 mine, 1 mile south of Garmans Mills, Susquehanna township.
45. Outcrop at Garmans Mills, Susquehanna township.
46. Outcrop at Punkey Hollow, Susquehanna township.
47. Hastings Coal & Coke Company. Kenport No. 1 mine, at Kenport Station on West Branch, Susquehanna township.
48. Moor Bros. Coal Company. Moor No. 1 mine, at Emeigh, Susquehanna township.
49. Cherry Tree Coal Company. Victor No. 17 mine, 1½ miles southeast of Emeigh, Susquehanna township.
50. Barnes & Tucker Company. Lancashire No. 7 mine, in Barnesboro borough.
51. Barnes & Tucker Company. Lancashire mine No. 3, ½ mile west of Barnesboro, Barr township.
52. McCombie Coal Company. McCombie No. 2 mine, 1 mile southwest of Barnesboro, Barr township.
53. Pennsylvania Coal & Coke Corporation. Pennsylvania No. 21 mine, at Moss Creek, Barr township.
54. Pennsylvania Coal & Coke Corp. Pardee No. 61 mine, ⅔ mile west of Spangler, Barr township.
55. Woodland Coal & Coke Company. Woodland No. 1 mine, ½ mile south of Spangler, Barr township.
56. Duncan-Spangler Coal Company. Brubaker No. 13 mine, 1½ miles west of Bakerton, Barr township.
57. Carrolltown Coal Company. Victor No. 1 mine, 1 mile west of Benedict, West Carroll township.
58. Carrolltown Coal Company. Victor No. 2 mine, ½ mile northwest of Carrolltown, West Carroll township.
59. Binder Coal Mining Company. Binder No. 2 mine, 1 mile southwest of Carrolltown at tunnel siding, West Carroll township.
60. W. A. Gould and Bro. Black Diamond mine, 1 mile southeast of Carrolltown Road station, West Carroll township.
61. Pennsylvania Coal & Coke Corp. Pennsylvania No. 50 mine, 3½ miles southwest of Patton on left bank of Little Chest Creek, East Carroll township.
62. Pennsylvania Coal & Coke Corp. Pennsylvania No. 35 mine, 2 miles west of Patton, on Dry Run, East Carroll township.
63. Pennsylvania Coal & Coke Corp. Pennsylvania No. 28, 1½ miles west of Patton, East Carroll township.
64. Outcrop at Rexis, Blacklick township.
65. Outcrop at Vintondale, Blacklick township.
66. Outcrop at Weber, Blacklick township.
67. Blacklick Collieries Company. Hughes No. 14 mine, 1 mile north of Twin Rocks Station, Blacklick township.
68. Bethel Coal Company. Bethel No. 1 mine, 3 miles northwest of Nanty Glo on Cambria and Indiana Railroad, Blacklick township.
69. Stratford Coal Mining Company. Stratford No. 1 mine, ½ mile southeast of Nanty Glo, Blacklick township.
70. Pergrin Coal Company. Pergrin No. 1 mine, ¾ mile southwest of Nanty Glo, Jackson township.

UPPER FREEPORT (E) COAL.

The Upper Freeport coal outcrops in many places in the Johnstown-South Fork-Windber district. The coal has a practically uniform composition with a high percentage of fixed carbon, comparatively low moisture, and high ash and sulphur content.

In the vicinity of Johnstown the bed averages about 3 feet 5 inches thick. The coal occurs in one main bench. Locally, a bench 3 or 4 inches thick comes in below, separated from the main bench by 5 to 6 inches of shale or bone; it is never worked. The coal is very clean and the only marked impurity is a local draw slate. The bed is regular in thickness and has no marked rolls in either roof or bottom. Along Conemaugh River and on the west flank of the Wilmore basin the coal is rather dirty and unimportant, since it is split by small bone or shale partings into two or three benches, only the two lower benches being workable. The upper workable bench ranges from 1 to 2 feet and the lower from 1 foot 6 inches to 2 feet thick, separated by bone or shale parting ½ inch to 2 inches thick. The coal is mined at South Fork, where it resembles, both in thickness and quality, the same bed at Dunlo. The bed here is divided into two benches by a thin shale or bone parting which is readily removed by picking.

The Upper Freeport bed has not been much prospected in the Winber area, but drill records show that it averages 3 feet thick. The coal is good in the main bench, as in the Johnstown area.

At the present time there are few openings in the bed because of the greater importance of the Lower Kittanning coal in the same district. Its value is not overlooked, however, and with the depletion of the more valuable coals this bed will become a large producer.

The Upper Freeport coal is one of the most important in the Portage-Gallitzin district, and has had an enormous production for many years as a steam and coking coal. As a steam coal it is equal to the Lower Kittanning in the same region except that it is higher in sulphur. The coal has been coked with success in the beehive ovens in the vicinity of Gallitzin. The bed is very regular and averages 4 feet thick in the district; the greatest thickness is 5 feet 1 inch at Gallitzin. At Lilly the average thickness is 5 feet; at Portage the same; in the Puritan area 3 feet 11 inches; and in the Beaverdale Branch area 3 feet 5 inches. The only bone or shale binder rarely exceeds 6 inches in thickness. The bed is free from rock rolls and faults; no clay veins are present.

The greatest number of openings in the mountain district is in the Upper Freeport bed. Many farm and custom coal drifts are opened midway on the hillsides and numerous large mines are operated. The bed is not so thick in this district as in other parts of the county, but its analyses compare favorably with those of the same coal in the Barnesboro-Patton district. The sulphur is rather high, but the ash is fairly low. No coking tests have been made on it in this district, but it is reputed to be a good steam coal. This bed is thickest from Figart north along the Bellwood Branch of the Pennsylvania Railroad and in the valley of Clearfield Creek, but probably does not exceed 3 feet 9 inches. The bed is divided into two benches by a characteristic 1 to 2 inch bone parting, which lies 4 to 14 inches from the bottom. This parting is readily separated by picking, so that both benches are mined profitably. The upper bench averages 2 feet 4 inches thick; the lower bench is 4 to 18 inches thick. New operations are beginning on Clearfield Creek and a good production is predicted in the future. The coal is of good quality, clean, with the exception of one small parting, and easily accessible by drift on the hill slopes. Large acreages remain unprospected and when the better known areas of Cambria County have been exhausted, Clearfield Creek will undoubtedly become one of the large mining centers of the county.

The Upper Freeport bed is mined extensively in the Barnesboro-Patton district. It is considered a very valuable coal although it has more sulphur than the Lower Freeport; its ash content is above the average. The bed outcrops well up on the hills along West Branch and Chest Creek and their tributaries. Its most extensive development is in the vicinity of Barnesboro. The thickness of the bed is variable; the maximum is 5 feet; the average 3 feet 6 inches. It carries partings and binders of bone and slate, varying much in thickness, persistence, and number. An 8-inch binder of shale, fire clay, or bone is common near the bottom. A 4-inch bench of coal which is never worked is always present below this binder. This bed is free from roof and bottom rolls, and clay veins which are present in the lower coals. The coal is excellent for steaming purposes, and does not clinker under the boiler as much as would be expected of a coal so high in sulphur. It has been coked with varying success at Hastings and Moss Creek.

The following sections are typical of the Upper Freeport in Cambria County:

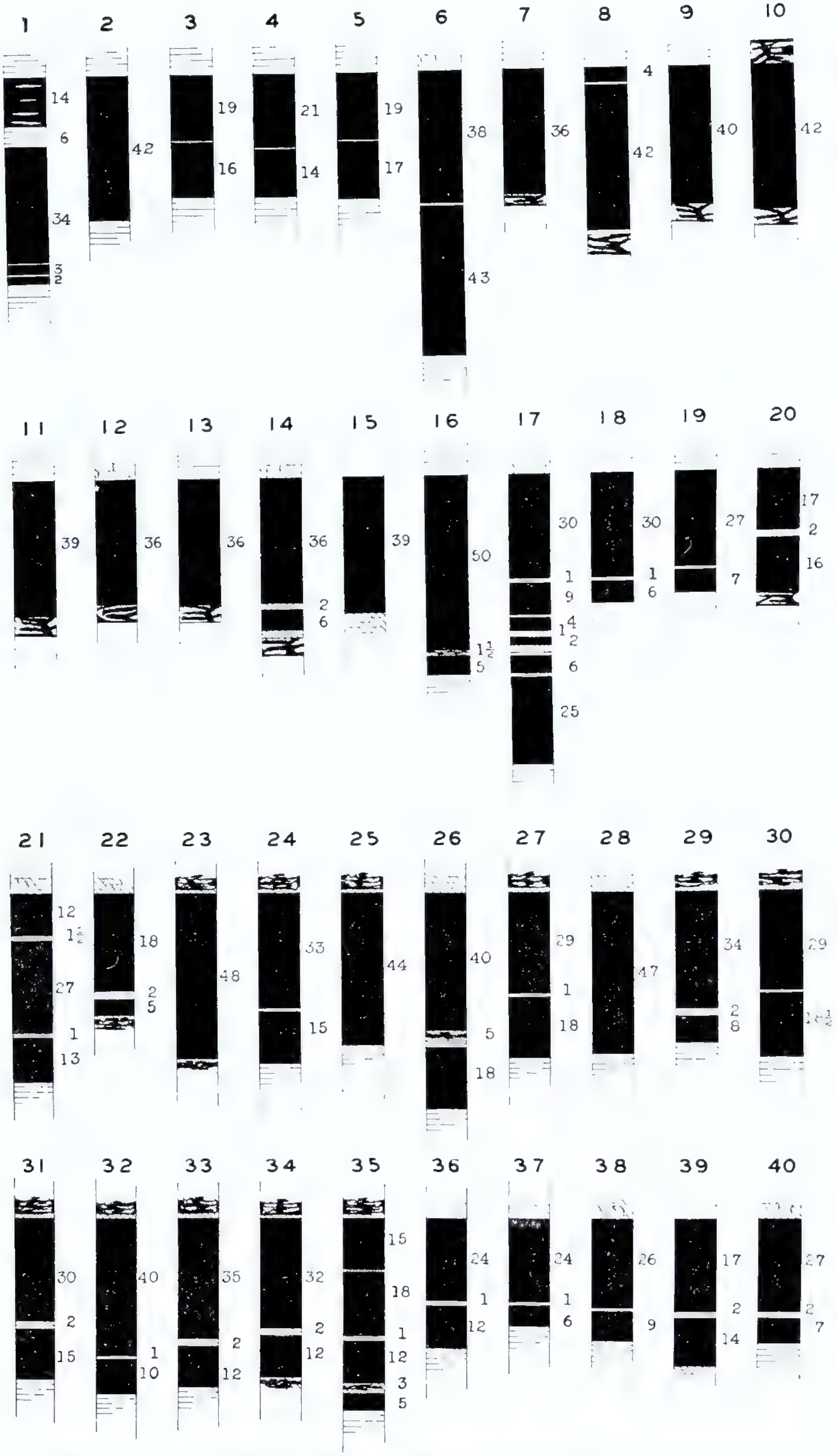


Figure 47. Sections of Upper Freeport coal in Cambria County.

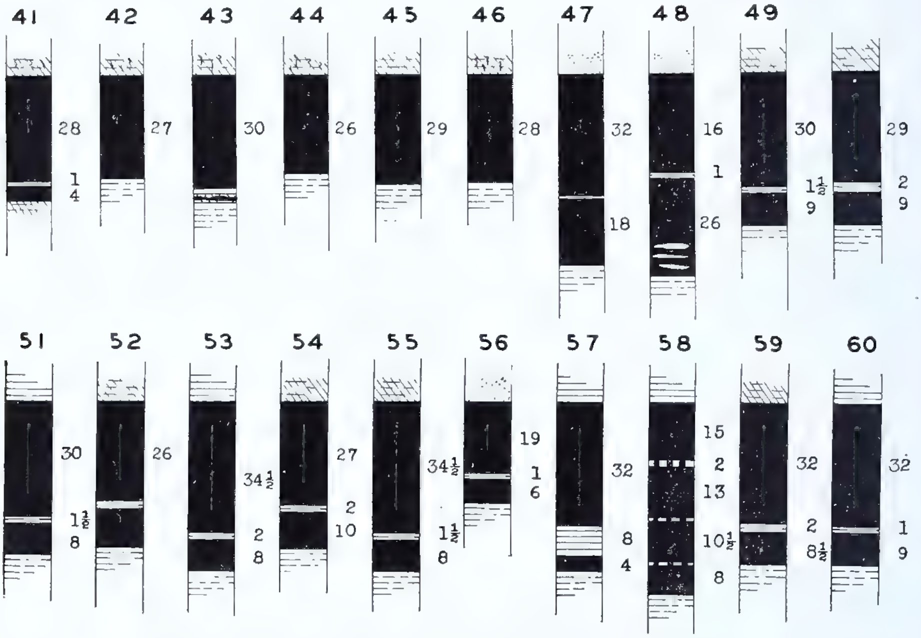


Figure 48. Sections of Upper Freeport coal in Cambria County.

1. Laurel Hill Coal Co. Felix mine, ½ mile south of Johnstown City line at D Street, Lower Yoder township.
2. Country bank, on St. Clair Run, Lower Yoder township.
3. Country bank, at Roxbury, Upper Yoder township.
4. Country bank, at Rosedale, Hinckston Run, West Taylor township.
5. Outcrop at Coopersdale, West Taylor township.
6. Citizens Coal Co. Dale mine, in Dale boro.
7. Ideal Coal Co. Thermal No. 6 mine, on Ash Street, Johnstown.
8. River Coal Co. River Coal No. 1 mine, in Southmont boro opposite Dale.
9. Hannan Coal Co. Hannan mine opposite Moxham, Upper Yoder township.
10. Smokeless Coal Co. Smokeless No. 2 mine, in Ferndale boro.
11. Colonial Coal Co. Colonial No. 1 mine, opposite Ferndale.
12. Solomon Run Coal Co. Solomon Run No. 3 mine, 1½ miles southeast of Johnstown, on Solomon Run, Stony Creek township.
13. Outcrop on Sams Run, Stony Creek township.
14. Telford Coal Co. Telford No. 1 mine, 1 mile east of Pennsylvania railroad station, Conemaugh township.
15. Country bank, mouth of Clapboard Run, Conemaugh township.
16. Country bank, on headwaters of Clapboard Run, Conemaugh township.
17. Logan Coal Co. Logan No. 7 mine, at Dunlo, Adams township.
18. G. A. Slick & Son Coal Co. Mine No. 1, 1 mile south of South Fork, Adams township.
19. Riverside Coal Mining Co. Mine No. 1 in South Fork Boro.
20. Flenner Coal Co. Flenner No. 1 and 2 mines, ¾ mile south of Pennsylvania railroad station, South Fork, Croyle township.
21. Beaver Run Coal Co. Beaver Run mine, ½ mile west of Lloydell station, Summerhill township.
22. Logan Coal Co. Logan No. 6 mine, at Beaverdale, Summerhill township.
23. Pearce Coal Mining Co. Excelsior No. 2 mine, at Puritan, Portage township.
24. Beachley Coal Co. Beachley No. 4 mine, 2½ miles southeast of Portage on Trout Run, Portage township.
25. Trout Run Mining Co. Portage No. 5 mine, 1 mile southeast of Portage, on Trout Run, Portage township.
26. Sonman Shaft Coal Co. Sonman slope at Sonman, Portage township.
27. Pennsylvania Collieries, Inc. Cassandra mine at Cassandra, Washington township.
28. Shoemaker Coal Mining Co. Wilmore No. 3 mine, ½ mile east of Cassandra, Washington township.
29. W. H. Piper & Co. Sonman No. 5 mine at Lilly, Washington township.
30. Pennsylvania Collieries, Inc. Lilly No. 41 mine at Dysertown, Cresson township.
31. Pennsylvania Coal & Coke Co. Gallitzin shaft at Gallitzin, Gallitzin township.

32. Taylor & McCoy Coal & Coke Co. Gallitzin shaft at Gallitzin, Gallitzin township.
33. Pennsylvania Coal & Coke Corp. Gallitzin No. 10 mine, ½ mile northwest of Gallitzin, Gallitzin township.
34. Altoona Coal & Coke Co. Delaney No. 7 mine, ¼ mile north of Amsbry station, Gallitzin township.
35. Pennsylvania Coal & Coke Co. Amsbry No. 7 mine at Amsbry station, Gallitzin township.
36. The Home Co. Shaver No. 1 mine, ¼ mile northeast of Ashville station, Dean township.
37. Glasgow Fuel Co. Glasgow Fuel No. 1 mine, at Glasgow, Reade township.
38. Navy Standard Coal Co. Beccarria No. 1 mine at Glasgow, Reade township.
39. Forks Coal Co. Hughes No. 11 mine, 2 miles southwest of Blandburg, Reade township.
40. Beacon Coal Co. Peerless No. 1 mine, ½ mile southeast of Van Ormer, Reade township.
41. Fallen Timber Coal Co. Colonial No. 5 mine, ¼ mile east of Fallen Timber, Reade township.
42. Clear Hill Coal Mining Co. Clear Hill No. 1 mine, 1 mile southeast of Flinton station, Reade township.
43. Reade Coal Co., Inc. Reade No. 2 mine, ½ mile northeast of Flinton, Reade township.
44. Fallen Timber Coal Co. Colonial No. 7 mine, ¾ mile north of Flinton station, Reade township.
45. Strayer Bros. Strayer No. 2 mine, 1¼ miles southwest of Flinton station, White township.
46. Calorie Coal Co. Calorie No. 1 mine, 1 mile south of Flinton station, White township.
47. Reorganization Committee Eastern Bituminous Coal Mining Bonds. Dean No. 8 mine, 1½ miles northwest of Frugality station, White township.
48. Dexcar Coal Mining Co. Claire No. 1 mine, ½ mile northwest of Ashville station, Clearfield township.
49. Rich Hill Coal Co. Rich Hill No. 1 mine, 1 mile north of Hastings, Elder township.
50. Pennsylvania Coal & Coke Corp. Pennsylvania No. 11-E, on Brubaker Run, 1¼ miles northwest of Hastings, Elder township.
51. Madeira Hill Coal Mining Co. Spangler No. 3 mine on headwaters of Walnut Run, 2 miles east of Barnesboro, Susquehanna township.
52. Cymbria Coal Co. Cymbria No. 2-E mine, 2 miles east of Barnesboro on Walnut Run, Susquehanna township.
53. Pennsylvania Coal & Coke Corp. Pennsylvania No. 17-E mine, 1⅓ miles east of Barnesboro on Byrnes Run, Susquehanna township.
54. M. A. Byrnes Coal Co. Byrnes No. 1 mine, 1½ miles east of Barnesboro, Susquehanna township.
55. Barnes and Tucker Co. Lancashire No. 10 mine, 1¼ miles northeast of North Barnesboro, Susquehanna township.
56. Empire Coal Mining Co. Empire E mine, 1 mile northeast of Barnesboro, Susquehanna township.
57. Mine, 1 mile east of Barnesboro, Susquehanna township.
58. Mine, 3 miles north of Pindleton, Susquehanna township.
59. F. B. Wood Coal Mining Co. Wood No. 2 mine, ½ mile southeast of Spangler, West Carroll township.
60. Mine, 1 mile south of Spangler, West Carroll township.

CHAPTER VII.

CAMERON COUNTY.

INTRODUCTION.

Cameron County is a deeply dissected plateau 2000 feet above sea level, with main streams cutting down to 750 feet above tide. The county is crossed in a northeast-southwest direction by a series of anticlines and synclines. Only one of the synclines is deep enough to preserve the coal-bearing groups from erosion. The axis of this basin extends midway between West Branch and Sterling, and crosses Sinnemahoning Creek midway between Emporium and Cameron. A few isolated areas of coal remain in the highest hills in the northwestern part of the county.

The coal beds are in the lower part of the Allegheny group and in the Pottsville series. They are mined only for local fuel at the present time.

COALS

MARSHBURG (SHARON ?) COAL.

The Marshburg coal is thin in Cameron County, averaging less than 12 inches, and having a maximum thickness of 3 feet. It is not mined.

ALTON (MERCER ?) COAL.

The coals of the Alton group, usually three in number, are generally thin and high in ash.

The Upper Alton coal is 3 feet thick on Canal Run. It generally is split into two benches by a shale parting near the middle. It is high in ash. On Sterling Run the coal is 3 feet 8 inches thick, but is extremely high in ash and sulphur.

The Middle and Lower Alton coals average less than 12 inches thick, and are very impure.

CLARION (CLERMONT, A′) COAL.

The Clarion coal, lying about 80 feet below the Lower Kittanning coal, has been opened at several places in the Cameron basin. It ranges from 2 to 4 feet thick, and is locally a good clean coal, but high in sulphur. This bed is not worked at present.

LOWER KITTANNING (B, DAGUS) COAL.

This coal is geologically the highest in Cameron County, and is present only in isolated areas in the Cameron basin. Here it averages 3 feet thick, having a maximum thickness of 3 feet 8 inches. It occurs in a single bench, but contains numerous thin local bone partings.

CHAPTER VIII.

CENTRE COUNTY.

INTRODUCTION.

There are eight coal beds in Centre County. The Lower Kittanning and Lower Freeport are the most important. The Brookville, Middle Kittanning, and Upper Freeport coals are locally thick. The Clarion and Mercer coals are thin and unimportant.

The coal districts of Centre County are served by two railroads. The Pennsylvania Railroad, entering the county from the south at Gardner, serves the Sandy Ridge, Osceola, and Philipsburg district. A branch line from Snow Shoe intersection, in the central part of the county, serves the Snow Shoe district.

The New York Central and Hudson River Railroad enters the county near Peale, runs northeast through the mining districts of Moshannon and Snow Shoe, and follows Beech Creek to the eastern edge of the county.

All but one of the highways in the coal districts are dirt roads. Coal for local use is transported over them.

The coal districts are on the west flank of Allegheny Mountain in very rugged country. The streams flow through narrow valleys with outcrops of massive sandstone along their slopes.

STRUCTURE.

The coal districts are contained in two basins having a general northeast-southwest trend.

The principal basin contains the coal districts of Philipsburg-Moshannon-Snow Shoe and Beech Creek. The axis of the trough rises and falls, alternately lifting into the air and burying the coal beds.

The West Branch of the Susquehanna practically marks the trough of the second basin, which preserves a few acres of coal in the vicinity of Karthaus.

STRATIGRAPHY.

The coal beds of Centre County are contained in the Allegheny group and Pottsville series of Carboniferous age.

The Allegheny group is composed of massive sandstones, shales, limestones, clay beds, and several important coals.

The Pottsville series is composed of massive sandstone, a few feet of shale, and an unimportant coal bed.

COAL.

There are two principal coal areas in Centre County; the first lies southeast of Moshannon Creek, in Rush township; the second lies in Snow Shoe and Burnside townships, extending north and east from Snow Shoe. These areas are surrounded by outcropping Pottsville rocks, which form the larger part of the northwest flank of Allegheny Mountain.

MERCER COAL.

The Mercer Coal, lying about 60 feet below the Brookville coal, is thin and unimportant. It is generally less than 12 inches thick and is dirty.

BROOKVILLE (A) COAL.

The Brookville coal, lying on, or separated from the Pottsville sandstone by a few feet of shale, is generally a thin dirty bed, but locally is thick and has good quality. It is mined for shipping coal in Rush township. Between Sandy Ridge and Osceola the minable coal is 3 feet 6 inches to 5 feet thick, thinning where roof rolls are present. The bed carries a top bony bench 12 inches thick.

The Brookville coal is opened at many places in Rush township, near Philipsburg, and ranges from 2 to 4 feet thick. It is generally rather dirty, and high in sulphur, and invariably has a bony bench at the top 3 to 12 inches thick. Roof rolls make mining uncertain. Opposite Munson and Winburne the bed averages 3 feet thick, not including a 6-inch bony bench at the top. The coal has fair quality, but is rather high in sulphur.

The Brookville coal is mined on Cherry Run, Snow Shoe township. Here it is 3 feet 6 inches to 4 feet 2 inches thick, not including an 8-inch bony bench at the top. The coal is rather high in sulphur, and both roof and bottom are very rolly. At Kato the bed is 4 feet thick, not including the top bony bench, and is very rolly.

The Brookville coal has been opened by farmers in eastern Snow Shoe township and in Burnside township, but it is dirty, and high in sulphur. It averages 3 feet thick.

The following sections are typical of the Brookville in Centre County:

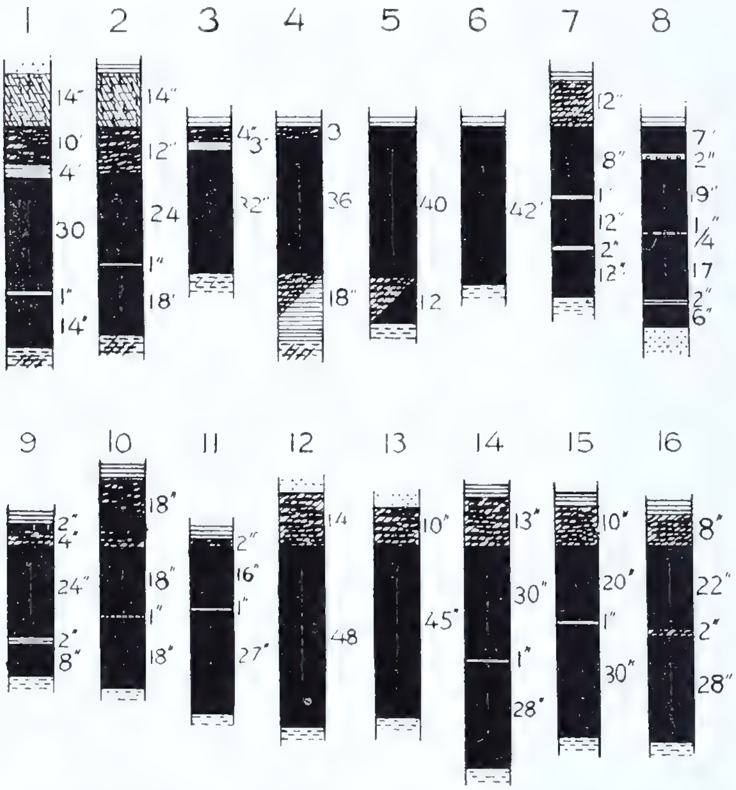


Figure 49. Sections of Brookville coal in Centre County.

1. Lehigh Valley Coal Company. No. 26 mine, 3 miles northeast of Clarence, on Big Sandy Run, Snowshoe township.
2. Lehigh Valley Coal Company. No. 25 mine, on Kato Road 2 miles northeast of Clarence, Snowshoe township.
3. Lehigh Valley Coal Company. No. 22 mine, on Cherry Run 1½ miles west of Clarence, Snowshoe township.
4. Kelley Bros. Coal Company. Cherry Run No. 7 mine, at Staub Hill, Snowshoe township.
5. Kelley Bros. Coal Company. Cherry Run No. 3 mine, on Cherry Run, west of Clarence, Snowshoe township.
6. Kato Coal Company. Kato No. 5 mine, at Kato. Snowshoe township.
7. Jacob Smutzinger. Coaldale No. 12 mine, near Munson, on N. Y. C. Railroad branch from Ophir, Snowshoe township.
8. Smooth Hill Coal Company. Smooth Hill No. 2 mine, 1 mile east of Philipsburg, Rush township.
9. Morning Star & Schnars. Schnars mine, at Ophir, Rush township.
10. Atherton-Barnes Company. Belfast mine, on One Mile Run, 1½ miles east of Philipsburg. Rush township.
11. J. Edward Horn & Company. Horn, No. 9 mine, on One Mile Run, 1½ miles east of Philipsburg, Rush township.
12. Brighton Coal Mining Company.Caswin No. 1 mine, 2 miles south of Osceola Mills on Trout Run branch of P. R. R., Rush township.
13. Trout Run Coal Company. Trout Run No. 1 mine, at Osceola Station, Rush township.
14. Bigelow Run Coal Company. Bigelow Run Nos. 1 and 2 mines, at Osceola, Rush township.
15. Blair Bros. Coal Company. Orient No. 6 mine, at Powelton, Rush township.
16. Outcrop on north side of railroad between Powelton and Sandy Ridge, Rush township.

CLARION (A′) COAL.

The Clarion bed, lying 15 to 25 feet above the Brookville, is very thin and dirty in Centre County. Attempts to mine it have been unsuccessful. It is locally 3 feet thick, but thins down to less than 12 inches within a few yards.

LOWER KITTANNING (B) COAL.

The Lower Kittanning coal, lying about 65 feet above the Brookville, is one of the important coals of Centre County, and has furnished a large quantity of commercial coal.

Near Retort, the Lower Kittanning averages 4 feet 7 inches thick, including 6 inches of bone coal about 6 inches from the top; at Osceola, it is 4 feet 6 inches to 5 feet thick, not including a bony bench at the top, 12 inches thick. At Boynton it ranges from 4 feet to 4 feet 8 inches thick, not including a 12-inch bony bench at the top. The Lower Kittanning coal is mined extensively at South Philipsburg, where it ranges from 4 feet to 5 feet 6 inches thick. Here it carries numerous bony bands, and part of the coal is canneloid, high in ash. On Onemile Run the coal averages 4 feet 2 inches thick, and generally has 6 to 9 inches of bone coal 8 inches from the top. A 1-inch pyrite seam is invariably present 7 inches from the bottom. On North Run the coal averages 3 feet 6 inches thick, not including 12 to 15 inches of bone at the top. The roof is rolly, and in places cuts out the bony coal. Opposite Munson the coal is 3 feet 6 inches thick. It has a characteristic bony bench at the top, and local bony partings in the main bench. At Tunnel Mines the bed averages 3 feet 6 inches thick, including 6 inches of bony coal at the top, and a local bone parting, 1 inch thick, near the middle of the bed. The Lower Kittanning is opened near Gorton for house fuel; it is 3 feet thick, but very impure.

In the Snow Shoe-Moshannon district the Lower Kittanning coal is mined extensively. It ranges from 3 to 5 feet thick, and its quality is irregular. On Cherry Run it averages 3 feet 6 inches thick, and has 4 inches of bony coal at the top; at Moshannon 3 feet thick, including 9 inches of bony coal at the top; at Clarence (Snow Shoe) 4 feet 8 inches thick, including a 15-inch lower bench, with many thin bone and pyrite partings, a 6-inch parting of clay and bone, 10 inches of good coal, a 4-inch bony parting, 17 inches of good coal, and a bony top 4 inches thick.

On Susquehanna River and Beech Creek the Lower Kittanning is thin, averaging less than 2 feet 6 inches thick, is dirty and present in isolated areas in the hills.

The Lower Kittanning coal ranges from 20 to 24 per cent volatile matter, 59 to 67 per cent fixed carbon, 6 to 16 per cent ash, 0.6 to 3 per cent sulphur. It is a soft friable coal with stick and block structure, and mines out in fair-sized lumps.

The following sections are typical of the Lower Kittanning in Centre County:

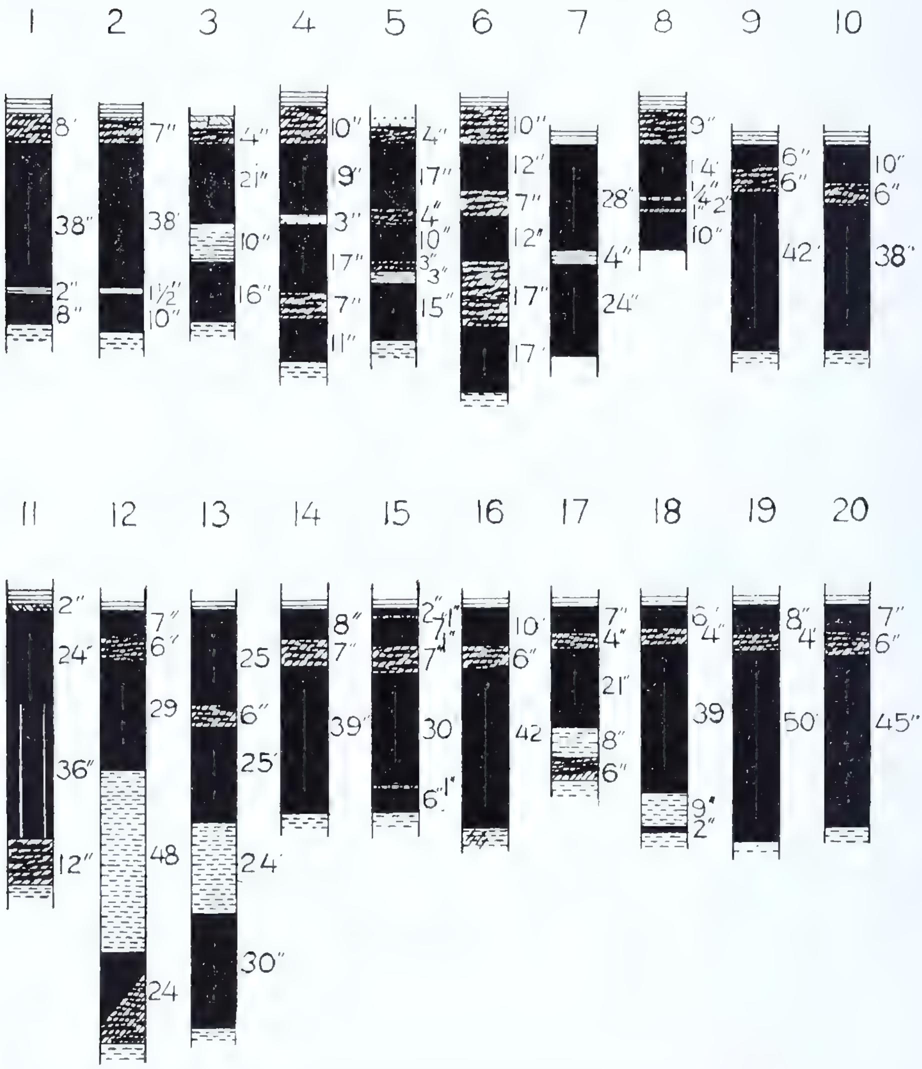


Figure 50. Sections of Lower Kittanning coal in Centre County.

1. Lehigh Valley Coal Company. Mine No. 9, on branch of north fork of Beech Creek, 1 mile northeast of Clarence, Snow Shoe township.
2. Lehigh Valley Coal Company. Mine No. 13, near head of north fork of Beech Creek 1 mile northwest of Clarence, Snow Shoe township.
3. Lehigh Valley Coal Company. Mine No. 18, on head of north fork of Beech Creek 1½ miles northwest of Clarence, Snow Shoe township.
4. Clarence Coal Company. Clarence No. 1 mine, on Cherry Run, 4 miles west of Clarence, Snow Shoe township.
5. Clarence Coal Company. Clarence No. 1 mine, on Cherry Run, 4 miles west of Clarence, Snow Shoe township.
6. Centre Steam Coal Company. Valentine No. 1 mine, on Per-Se branch of P. R. R. west of Clarence, Snow Shoe township.
7. Stover-Fuller Refractories Company. Birch Run mine, on Per-Se branch of P. R. R. near Clarence, Snow Shoe township.
8. O. G. Morgan. Mine No. 20, 1 mile northeast of Moshannon, Snow Shoe township.
9. William Whitten. Whitten mine, at Ophir, on Hawk Run division P. R. R., Rush township.
10. James F. Stott Coal Company. Red Jacket No. 1 mine, at Ophir, east of Hawk Run, Rush township.
11. Moshannon Creek Coal Company. Moshannon Creek No. 1 mine, at Philipsburg, Rush township.
12. Moshannon Coal Mining Company. Moshannon No. 11 mine, at South Philipsburg, Rush township.
13. Penelec Coal Corporation. Penelec No. 4 shaft, Philipsburg Boro., Rush township.

14. George Stott & Company. Royal No. 2 mine, on One Mile Run, Rush township.
15. T. J. Lee. Chester mine, South Philipsburg. Rush township.
16. James Sommerville. Electric mine, near Osceola Station, Rush township.
17. John L. Munro. Beaver Nos. 2 and 3 mines, at Osceola, Rush township.
18. Moshannon Coal Mining Company. Moshannon No. 10 mine, at Osceola Station, Rush township.
19. Ghem Coal Company. Ghem mine, on P. R. R. 1 mile south of Osceola Mills, Rush township.
20. Harbison-Walker Refractories Company. Retort mine, 1½ miles north of Sandy Ridge, Rush township.

MIDDLE KITTANNING (C) COAL.

The Middle Kittanning coal is generally thin and unimportant in Centre County, although it is locally 4 feet thick. Where thickest it is full of thin bone and pyrite partings that make the coal extremely impure. It is mined only for house coal.

UPPER KITTANNING (C′) COAL.

The Upper Kittanning coal, lying at an average interval of 75 feet above the Lower Kittanning, is an important coal in Centre County. In the Osceola-Philipsburg district it ranges from 2 feet to 3 feet 6 inches thick. The coal is hard, and mines out in blocks. It carries no bone or shale partings, but sulphur streaks are numerous. The roof is generally rolly.

The Upper Kittanning coal has been important in the Snow Shoe-Moshannon district, but now is practically exhausted. Its average section shows a triple bed, an upper bench 2 feet 4 inches to 2 feet 7 inches thick; a middle bench 14 to 18 inches, and a lower bench from 5 to 12 inches thick. The partings are generally less than 2 inches thick. It is a bright hard coal, having good quality. The roof is very rolly.

LOWER FREEPORT (D, MOSHANNON) COAL.

The Lower Freeport coal, so important in Clearfield County, has been eroded in Centre County, with the exception of a few isolated areas along Moshannon Creek in the Osceola-Philipsburg district, and a few hilltops in the Snow Shoe-Moshannon district. Along Moshannon Creek it ranges from 2 to 5 feet thick, and is locally dirty. It generally occurs in two benches, the bottom and main one being separated from an upper bench by 2 to 4 inches of bony coal. The upper bench, usually from 6 to 12 inches thick, is partly canneloid coal.

On Cherry Run, in the Snow Shoe-Moshannon district, the Lower Freeport is locally 6 feet thick. The coal has fair quality, and has but one thin parting 18 inches from the bottom. At Clarence it is 4 feet thick, including 1 inch of bone, 6 inches above the bottom; and at Moshannon 3 feet 6 inches thick.

UPPER FREEPORT (E) COAL.

The Upper Freeport bed caps about twenty of the highest knobs on the western flank of Allegheny Mountain, and now is practically worked out. It ranges from 2 feet 6 inches to 5 feet thick, locally carries 2 inches of bone near the middle, and is usually a good hard coal. Formerly it has been coked with much success in the Snow Shoe-Moshannon district. Both roof and bottom of the bed are rolly.

CHAPTER IX.

CLARION COUNTY.

INTRODUCTION.

Clarion County has twelve coal beds, four of which are now being worked for shipping coal; five others are mined for local fuel, and the remainder are of no commercial importance at present.

The Pennsylvania Railroad follows Redbank Creek from the eastern county line to its mouth, and the east bank of Allegheny River from Redbank to Emlenton. A branch line runs between Lawsonham, Rimersburg, and Sligo. The Baltimore and Ohio Railroad runs northeast from St. Petersburg to Shippensville, and thence to the northeast corner of the county. The New York Central Railroad crosses the county in a general northwest direction from Sutton and enters Venango County just east of Van. The Lake Erie, Franklin and Hamilton Railroad serves the section east of the county seat.

Practically all the highways are dirt, and the main traveled ones are kept in good condition. Coal for local use is transported over the highways.

The surface of Clarion County is very hilly and much dissected by streams. The larger streams flow in canyon-like gorges, with narrow flood plains and precipitous slopes. The valleys of the smaller streams are disproportionately wider, and have a very small gradient near their headwaters. The more or less uniform level of the higher hilltops represents the remnants of an old peneplain.

On the lower part of Clarion River and on Allegheny River the slopes are broken by terraces, most of which are between 200 and 210 feet above the present stream levels. These terraces are cut in sandstone, and are covered with a layer of glacial gravel, in places more than 100 feet thick.

STRUCTURE.

All the structural features of Clarion County, with the exception of the Fairmount syncline, are poorly defined, and form a part of an irregular monocline, rising gently northwest.

Fairmount syncline lies in the southeast corner of the county, just west of Hawthorne and Shannondale. The greatest dips in the county are on the flanks of this basin, the rocks on the southeastern flank dipping from 100 to 150 feet per mile, and on the northwestern flank from 100 to 175 feet per mile. The axis rises gradually northeast.

Kellersburg anticline, lying northwest of Fairmount syncline, crosses Redbank Creek one mile west of Climax, extends northeast near Frogtown and leaves the county a few miles north of Corsica. The southeastern flank of the anticline dips 75 to 175 feet per mile; the northwest flank dips 50 to 125 feet per mile. The axis is well defined, and rises regularly northeast.

Bradys Bend syncline crosses Redbank Creek about two miles east of Lawsonham, follows a direct northeast course to Rockville, turns sharply to a direction a little east of north, and disappears near Brinkerton. The dips on the flank of this syncline are 25 to 75 feet per mile; the axis gradually rises northeast.

Rimersburg anticline is a low fold extending from Rimersburg to Sharpsburg Church. It seems to be a limb of Kellersburg anticline that is nearly cut off by Bradys Bend syncline. The fold is best developed near Rimersburg, but dies out a short distance west of that place.

Northwest of Kellersburg anticline in the northern part of the county is a broad shallow basin, with the rocks rising gradually northwest to the axis of a minor anticlinal fold.

The rocks in the western part of the county rise gradually northwest in an anticlinal fold, with irregular dips where local minor structures disturb it.

STRATIGRAPHY.

The consolidated rocks exposed in Clarion County belong to the Mississippian and Pennsylvanian series of the Carboniferous system. The unconsolidated gravels along stream valleys are of Quaternary age.

The Conemaugh group has been almost entirely eroded in Clarion County, only a maximum thickness of 230 feet remaining in the hills in the southern part. It is composed of massive sandstone, shales, limestones, and thin coal beds.

The upper part of the Allegheny group has been much eroded in Clarion County, remaining intact only in a few hills in the southern part of the county. The lower part is wide-spread in all but Farmington township. The group is composed of massive sandstone, shale, clay beds, limestone, and several important coal beds.

The Pottsville series is composed of two massive sandstones, with a shale, clay, and coal interval between them. It is exposed in the northern part of the county, and along Clarion River and Piney Creek. As the Mauch Chunk group is lacking, the Pottsville group lies unconformably on the Burgoon sandstone.

The Pocono rocks are the lowest that outcrop in Clarion County. The principal exposure is on Clarion River above Clarion. The rocks are shales and sandstones, and coals are absent.

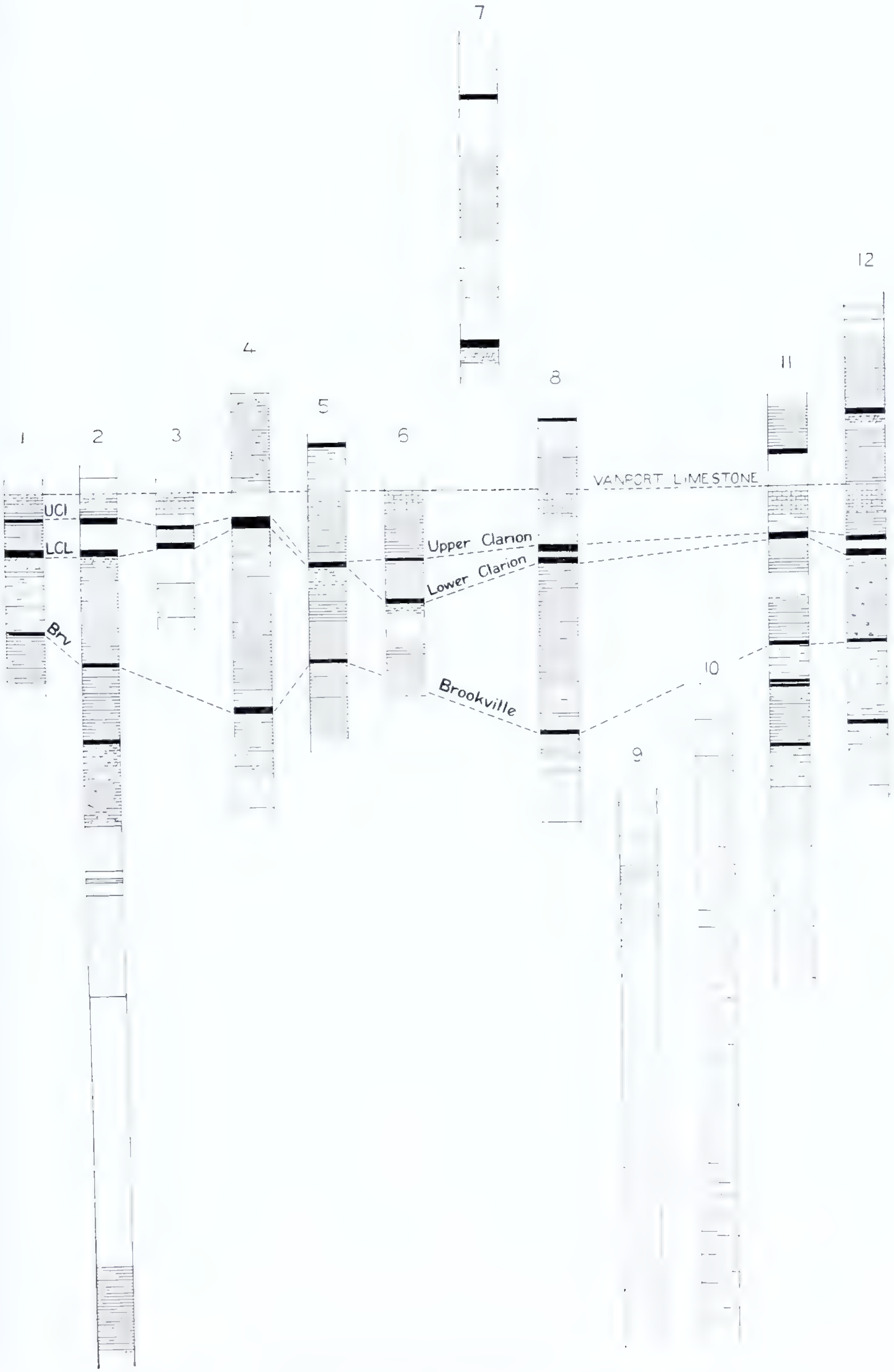


Figure 51. Stratigraphic sections. Clarion County.

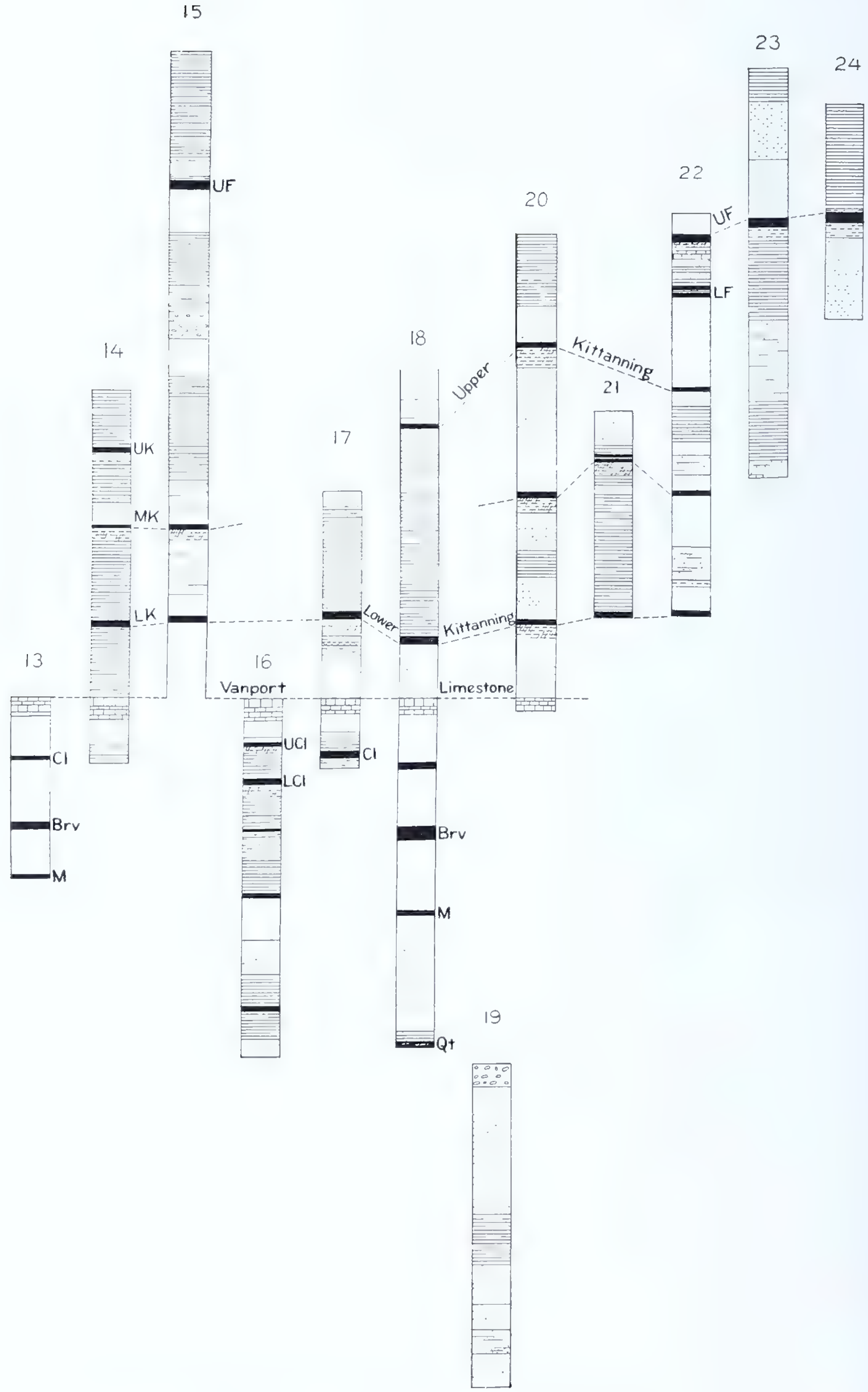


Figure 52. Stratigraphic sections cont'd. Clarion County.

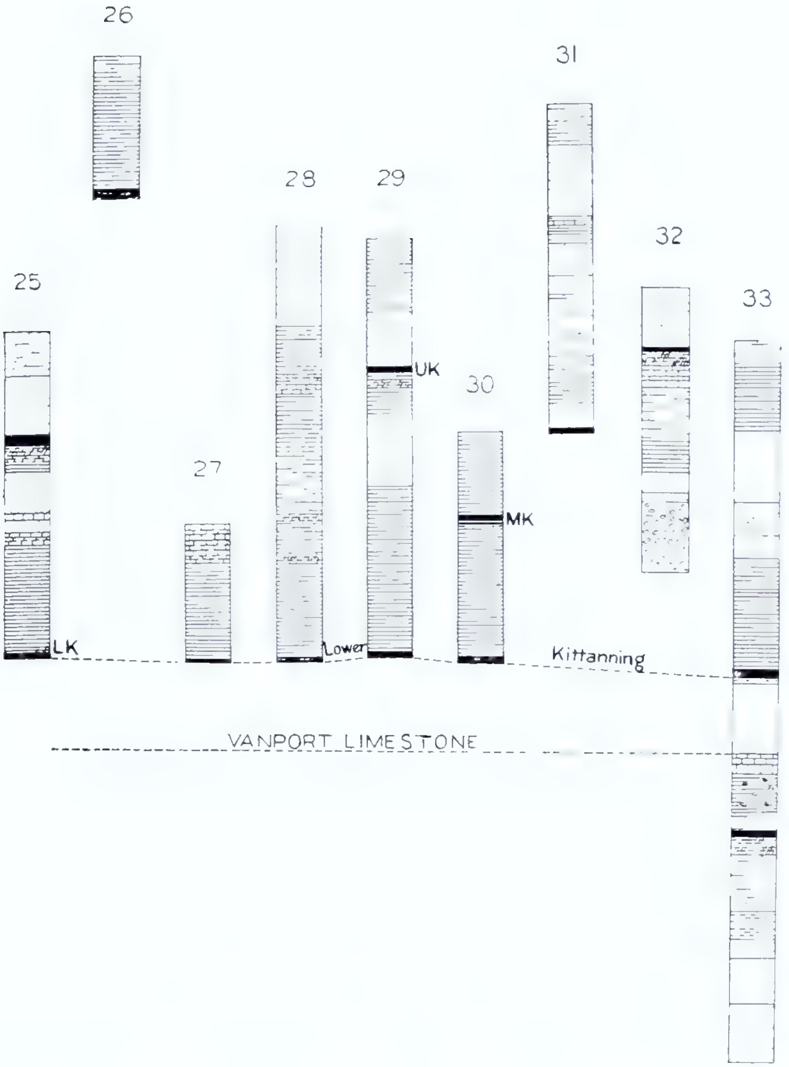


Figure 53. Stratigraphic sections cont'd. Clarion County.

1. One mile northeast of Emlenton.
2. One mile south of Emlenton.
3. 2½ miles east of Emlenton
4. 2 miles southeast of Emlenton,
5. At Mariasville,
6. 1½ miles southeast of Mariasville.
7. 1 mile north of St. Petersburg.
8. ½ mile east of St. Petersburg.
9. Southern part of St. Petersburg.
10. 1 mile south of Richmond.
11. ½ mile north of Richmond,
12. 1 mile east of Richmond,
13. 1 mile northeast of Perrysville,
14. 1 mile southeast of West Freedom,
15. ½ mile northeast of Dutch Hill.
16. 1 mile east of Callensburg.
17. ½ mile northeast of Zion Hill.
18. 1½ miles southeast of Callensburg.
19. Canoe Ripple.
20. Sligo.
21. Thomas Rutherford farm, near Mount Airy.
22. 4 miles northwest of Rimersburg.
23. 3 miles northwest of Rimersburg.
24. Rimersburg.
25. 3 miles northwest of Rimersburg.
26. Rimersburg.
27. 1¼ miles west of Rimersburg.
28. ½ mile west of Sandy Hollow.
29. 1½ miles east of Rimersburg.
30. 2 miles west of Rimersburg.
31. 1 mile west of Athens.
32. Sandy Hollow.
33. Southeast corner of Foxburg quadrangle.

Sections 1-33 from U. S. Geological Survey Bull. 454, Foxburg quadrangle.

COALS.

Clarion County is one of the outlying counties in the bituminous coal fields of Pennsylvania. The minable coal beds of Clarion County are contained in the Allegheny group. They are discussed in ascending geological order.

Generalized section of coal beds in Clarion County.

Group	Name of coal bed	Average interval	Range in thickness of coal beds		
			Ft.	Ft.	in.
Allegheny 310	Brush Creek		0	1	0
	Mahoning		0	1	6
		70			
	Upper Freeport (E)		0	6	3
		40			
	Lower Freeport (D)		0	7	0
		55			
	Upper Kittanning (C′)		0	4	0
		60			
	Middle Kittanning (C)		0	2	6
		55			
	Lower Kittanning (B)		1	4	6
		60			
	Clarion, upper		0	4	8
		15			
	Clarion, lower		2	7	0
		25			
	Brookville (A) or Craigsville		0	4	6
		40			
	Mercer		0	2	0

MERCER COALS.

The shales lying between the Homewood and Connoquenessing sandstones of the Pottsville group contains one or more coal beds that are impure and seldom exceed 12 inches thick. Locally one of these beds, the Mercer, may have minable thickness and quality.

BROOKVILLE (A) COAL.

The Brookville coal, lying a few feet above the Homewood sandstone, is very irregular but persistent in Clarion County. It is locally 4 feet 6 inches thick along Clarion River in the eastern part of the county, but is rather dirty and high in sulphur. Two miles southwest of Madison schoolhouse it is 2 feet 9 inches thick, including a

7-inch parting of shale and pyrite in the middle. It is mined east of Kingsville and west of Sutton and it is opened two miles west of Williamsburg, where it is 2 feet 4 inches thick. At Sligo and northeast of New Bethlehem it is locally 3 feet thick, but impure, and high in sulphur. The bed usually occurs in three benches separated by bone and sulphur partings 1 to 2 inches thick. The top bench of coal averages 12 inches thick, the middle bench 16 inches, and the bottom bench ranges from 4 to 10 inches thick.

In Clarion township the Brookville bed varies greatly in thickness, averages 4 feet, including two bone partings ranging from 1 to 4 inches thick. The middle bench of coal is thickest and averages slightly under 3 feet. The top and bottom benches each average about 6 inches thick.

In Limestone township the bed generally occurs in three benches of varying thickness. The top bench ranges from 6 to 8 inches thick, the middle bench from 11 inches to 2 feet 6 inches, and the bottom bench from 2 inches to 3 feet 3 inches thick.

In the vicinity of Knox the Brookville bed is divided into several benches by thick shale partings, the distance from the top of the highest bench to the bottom of the lowest being 15 feet. The bed is similarly parted at Shippensville, but toward the south the partings become thinner and disappear.

Work during 1921 demonstrated what has long been suspected that the Craigsville coal of the Foxburg-Clarion folio is the equivalent of the Brookville coal at Brookville, and that coals locally mapped as Brookville are at the Mercer horizon. Due to this error, confusion will exist in this area until the county has been re-surveyed. The intervals in the columnar sections have been revised.

The following sections are characteristic of the Brookville bed in Clarion County:

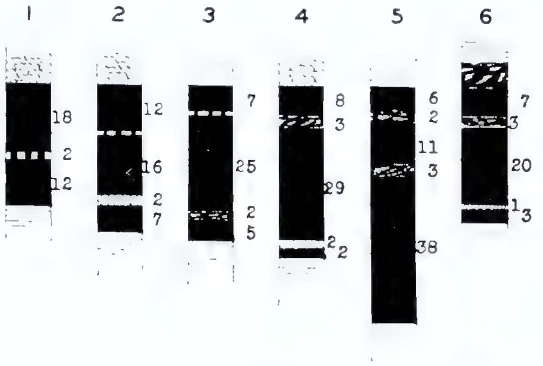


Figure 54. Sections of Brookville coal in Clarion County.

1. Country bank, 1 mile east of Easton, Licking township.
2. John C. Graham Coal Company. Graham No. 1 mine, $\frac{1}{4}$ mile west of Sligo Station, Piney township.
3. Strattonville Coal Mining Company. Stratton mine, at Strattonville, Clarion township.
4. Klamath Coal Company. Cummings No. 1 mine, 4 miles northwest of Summerville on L. E. F. & C. R. R., Limestone township.
5. Reed Coal and Mining Company. Reed No. 1 mine, 2 miles northwest of Summerville on L. E. F. & C. R. R., Limestone township.
6. Mercer Iron & Coal Company. Sutton No. 9 mine, 1 mile west of Heidrick Junction, Limestone township.

CLARION LOWER COAL.

The Clarion Lower Coal, lying about 40 feet above the Brookville, is the second most important bed in Clarion County. It is the most important coal in the southwest part of the county where it is persistent, and from 2 to 7 feet thick. It contains a large quantity of iron pyrite and is called the sulphur vein. It averages 4 feet thick on Allegheny River in Richland township, and is mined for shipping coal. The bed has no persistent physical character in this township.

The partings range from 1 to 16 inches thick and are variable in number.

In Beaver township the Lower Clarion averages 2 feet 1 inch to 5 feet 4 inches thick.

In Licking township the bed usually occurs in a single bench ranging from 12 inches to 1 foot 10 inches thick.

In Perry township the bed averages about 2 feet 6 inches thick, including two bone and shale partings ranging from $\frac{1}{4}$ inch to 5 inches thick. Locally the bed occurs in a single bench usually less than 2 feet thick. The Lower Clarion has no persistent physical character in Toby township. It is locally of minable thickness but is usually much split by bone and sulphur partings. The same characters are present in Piney township.

The Lower Clarion is mined at one locality in Monroe township. It averages 4 feet thick, including two bone partings 1 to 3 inches thick. The middle bench is thickest, averaging 3 feet 3 inches. It contains numerous nodules of pyrite.

In Paint township the Lower Clarion averages 3 feet 8 inches thick, including three thin bone and sulphur nodules. The coal contains numerous bone streaks and pyrite nodules.

The Lower Clarion is mined extensively in Knox township, where it varies much in physical character. It ranges from 2 to 5 feet thick, and contains two to five bone, sulphur, and shale partings ranging from a knife blade to several inches in thickness. Usually only one bench of the coal exceeds 2 feet in thickness.

The Lower Clarion is mined in Clarion township, and has a maximum thickness of 6 feet, averaging 5 feet. It often occurs in a single bench 2 to 4 feet thick, but the coal is high in sulphur and ash because of lenses of pyrite and bone. Usually the bed is split into numerous benches by thin sulphur and bone partings.

In Limestone township the coal is 2 feet 10 inches to 3 feet 4 inches thick, and is split into two benches by a pyrite binder 2 inches thick. The top bench of coal is 2 feet 3 inches thick, and the bottom bench 11 inches thick.

The Lower Clarion coal is of little value in the southeastern part of the county, where it averages slightly over 2 feet thick.

The Lower Clarion coal ranges from 37 to 39 per cent volatile matter, averaging 38 per cent; 46 to 52 per cent fixed carbon, averaging 48 per cent; 6 to 11 per cent ash, averaging 9 per cent; 3 to 6 per cent sulphur, averaging 4.5 per cent. The coal is generally hard and blocky, although locally it is soft and friable, and slacks when mined.

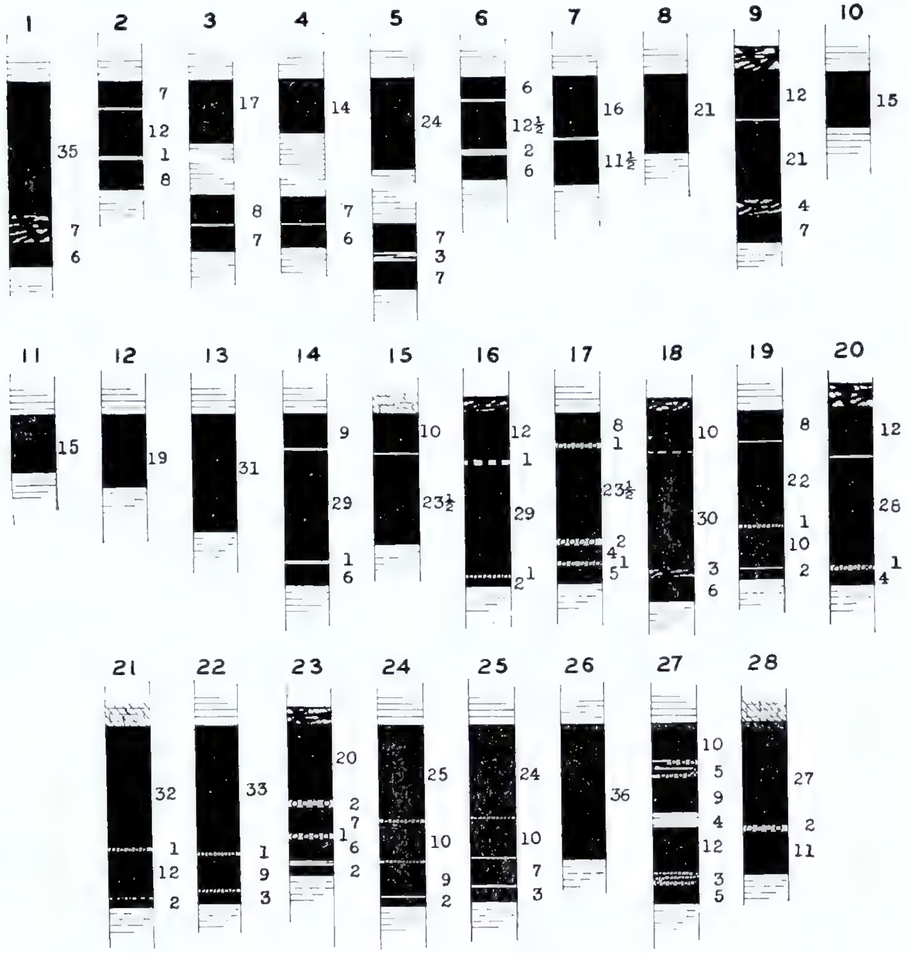


Figure 55. Sections of Clarion coal in Clarion County.

1. Bostaph Coal Company. Bostaph mine, at St. Petersburg, Richland township.
2. Outcrop 1 mile northeast of Emlenton, Richland township.
3. Outcrop 3 miles east of Emlenton, Richland township.
4. Outcrop east of St. Petersburg, Richland township.
5. Outcrop 2 miles southeast of Knox, Beaver township.
6. Outcrop 1 mile west of Lamartine, Salem township.
7. Outcrop 1½ miles southeast of Wentlings Corners, Beaver township.

8. Outcrop 1 mile northwest of Turnip Hole, Licking township.
9. Pine Run Coal Company. Parker No. 2 mine, 1 mile north of Parker, Perry township.
10. Outcrop 2 miles east of West Freedom, Perry township. (Upper bench).
11. Outcrop ½ mile southeast of Callensburg, Licking township. (Upper bench).
12. Outcrop 1¼ miles southeast of Callensburg, Licking township. (Upper bench).
13. Outcrop 1 mile west of West Freedom, Perry township.
14. Outcrop 2½ miles southeast of Callensburg, Toby township.
15. Monterey Coal Company. Monterey mine, 1 mile southeast of Monterey, Perry township.
16. Fredell Mining Company. Eagle mine, at Upper Hillville Station, Toby township.
17. Hill Fuel Company. Miller mine, ¾ mile north of Sligo Station, Piney township.
18. Rhea Coal Company. Rhea mine, at Reidsburg, Monroe township.
19. Paint Coal Company. Star mine, at Withurs Station, Paint township.
20. H. O'Neill & Company. O'Neill No. 2 mine, 1 mile south of Lucinda Station, Knox township.
21. Lucinda Coal Company. Baines mine, ¾ mile south of Lucinda Station, Knox township.
22. Lucinda Coal Company. Frampton mine, 1 mile south of Lucinda. Knox township.
23. Carroll Gatesman Coal Company. Carroll mine, at Lucinda, Knox township.
24. Lutz and Grieble Coal Company. Lutz mine, ½ mile south of Snydersburg Station, Knox township.
25. Joseph Grieble and Sons. Mottmiller mine, 1 mile north of Snydersburg Station, Knox township.
26. Mine on George Cook farm, ½ mile northeast of Clarion, Clarion township.
27. W. J. Gillen. Meadow Brook mine, 1½ miles north of Strattanville Station, Clarion township.
28. Shick Coal Company. Shick mine, 1 mile west of Holden, Limestone township.

CLARION UPPER COAL.

The Clarion Upper coal, lying from 10 to 20 feet above the Clarion Lower coal, seems to be split from that bed. It is extremely irregular, varying within a few feet from a few inches to 4 feet thick. Between Parkers Landing and St. Petersburg the coal is nearly 5 feet thick in places, and has been mined for shipment.

LOWER KITTANNING (B) COAL.

The Lower Kittanning, lying approximately 100 feet above the Brookville, is the most persistent and important producing bed in Clarion County. It is persistent and uniform in thickness, and averages approximately 3 feet. No regular partings occur in the coal, and local partings are thin, few of them over ½ inch thick.

In Richland township the Lower Kittanning averages 2 feet thick and occurs in two benches, separated by a shale parting ½ inch to 12 feet thick. The upper bench is usually thickest and is mined.

In Licking township the Lower Kittanning averages 2 feet 2 inches thick, including a 1-inch shale parting 11 inches above the bottom.

In Beaver township the bed ranges from 1 foot 7 inches to 2 feet 10 inches thick. Locally it occurs in a single bench, but it is usually separated into two benches by a shale parting ½ inch thick. The top bench ranges from 18 inches to 2 feet 2 inches thick.

In Perry township the Lower Kittanning ranges from 2 feet 3 inches to 3 feet thick. It occurs in two or three benches separated by bone and sulphur partings ranging from ½ inch to 1½ inches thick.

The Lower Kittanning is mined extensively in Toby township on the Sligo Branch of the Pennsylvania railroad. It ranges from 2 feet 10 inches to 3 feet 8 inches thick, averaging over 3 feet. It rarely occurs in a single bench. Its usual occurrence is in two benches separated by a bone parting ¼ to 1 inch thick. The bed contains local lenses of pyrite and bone.

In Madison township the Lower Kittanning is mined extensively along the Pennsylvania Railroad, and in the vicinity of Rimersburg. The coal ranges from 2 feet 4 inches to 3 feet 8 inches thick. It has no physical character that is persistent over extensive areas. The bed generally occurs in three benches and locally in five. The bone partings range from a knife blade in thickness to 5 inches.

Brady township contains a few acres of Lower Kittanning coal, and it is being mined at one locality. The bed is 3 feet 5 inches thick including two thin partings. The coal contains pyrite nodules and bone lenses.

In Piney township the Lower Kittanning averages 2 feet 10 inches thick, and is separated into two benches by a bone parting 1 inch thick. The top bench ranges from 6 to 10 inches thick, and the bottom from 1 foot 10 inches to 2 feet 4 inches thick.

The Lower Kittanning is being mined in the vicinity of Reidsburg in Monroe township. The bed ranges from 2 feet 6 inches to 4 feet 1 inch thick. It occurs in two benches separated by a bone parting ½ inch to 1½ inches thick. The top bench ranges from 8 to 10 inches thick, and the bottom bench from 1 foot 10 inches to 3 feet 6 inches thick.

The Lower Kittanning is mined extensively in Clarion township, where it ranges from 2 feet to 3 feet 6 inches thick. It persistently occurs in two benches separated by a bone coal parting 1 inch thick. The top bench ranges from 6 to 10 inches thick, and the bottom bench from 18 inches to 2 feet 2 inches thick.

The Lower Kittanning is mined at numerous localities in Limestone township. It varies much in physical character, and ranges from 2 feet 6 inches to 3 feet 4 inches thick. Its usual occurrence is in two benches, separated by a bone coal parting ranging from 1 to 5 inches thick. The top bench of coal ranges from 3 to 10 inches thick, and the bottom bench from 2 feet to 2 feet 6 inches thick.

The Lower Kittanning is being mined along the Pennsylvania Railroad in Redbank township. It averages 2 feet 6 inches thick, and varies greatly in physical character. It locally occurs in a single bench 3 feet thick. In other localities it is separated into two or more benches by bone and canneloid coal partings usually less than 1 inch thick.

The Lower Kittanning coal varies from 35 to 40 per cent volatile matter, 49 to 53 per cent fixed carbon, 5 to 10 per cent ash, and from 0.8 to 4 per cent sulphur. It is a stick and block coal, brilliant in luster, and mines out in fair lumps.

The following sections are typical of the Lower Kittanning in Clarion County:

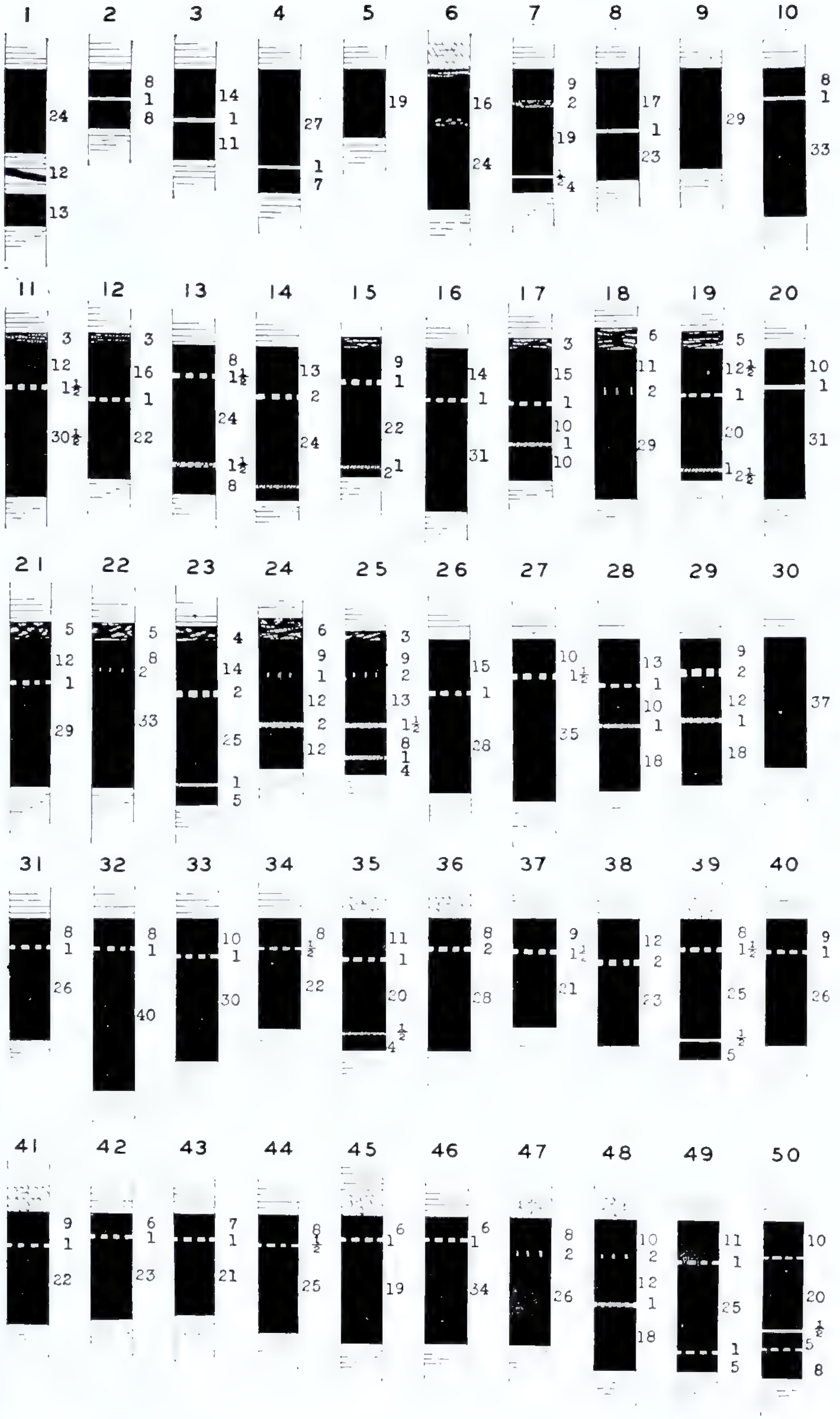


Figure 56. Sections of Lower Kittanning coal in Clarion County.

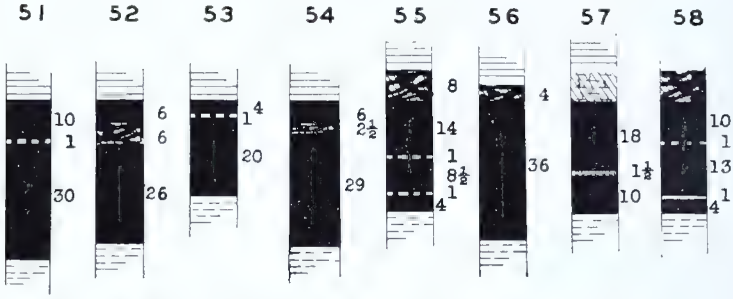


Figure 57. Sections of Lower Kittanning coal in Clarion County.

1. Outcrop ½ mile south of Keefer Mill, Richland township.
2. Outcrop ½ mile east of Richmond, Richland township.
3. Outcrop 1½ miles northeast of Turnip Hole, Licking township.
4. Outcrop ½ mile north of Wentlings Corners, Beaver township.
5. Outcrop ½ mile south of Wentlings Corners, Beaver township.
6. Church Hill Mining Company. Church Hill mine, 1 mile northeast of Church Hill, Perry township.
7. Joann Coal Company. Blue Goose mine, 1¼ miles north of Upper Hillville Station, Perry township.
8. Eagle mine, 1 mile east of Upper Hillville Station, Toby township.
9. Outcrop 1 mile northwest of Mt. Airy, Toby township.
10. Consumers Collieries Company. Turkey Run mine, 1 mile south of Sligo, Toby township.
11. Cherry Run Coal Mining Company. Cherry Run mine, ½ mile northeast of Huey Station, Toby township.
12. Clarion Coal Mining Company. Clarion mine, ¼ mile east of Huey Station, Toby township.
13. Cherry Run Fuel Company. Vogle mine, at Huey station, Toby township.
14. Hamler Coal Company. Hamler mine, at Huey Station, Toby township.
15. Chestnut Ridge Coal Mining Company. Chestnut Ridge mine, at Rimersburg, Toby township.
16. Standard Fuel Company. Standard No. 2 mine, at Rimersburg, Toby township.
17. Keystone Mining Company. Sarah Furnace No. 1 mine, ⅛ mile northwest of Sarah Furnace Station, Madison township.
18. Eagle Coal Company. Glenora mine, near Catfish, Madison township.
19. Redbank Coal Company. Monarch mine, near Redbank Station, Madison township.
20. Mortimer Run Coal Company. Mortimer Run mine, 1 mile east of Redbank Station, Madison township.
21. Lawsonham Coal Company. Lawsonham mine, 1 mile east of Lawsonham, Madison township.
22. Allegheny Block Coal Company. Long Point mine, near Lawsonham, Madison township.
23. Co-operative Coal Company. Crissman mine, 1 mile north of Lawsonham, Madison township.
24. Keystone Mining Company. Sterling No. 3 mine, 1 mile south of Diamond Station, Madison township.
25. Keystone Mining Company. Sterling No. 4 mine, 1 mile south of Diamond Station, Madison township.
26. Republic Gas Coal Company. Betty mine, 1 mile northeast of Diamond Station, Madison township.
27. Acme Gas Coal Company. Penn mine, 1½ miles south of Rimersburg Station, Madison township.
28. Acme Gas Coal Company. Acme mine, 1 mile south of Rimersburg Station, Madison township.
29. W. J. James. East Brady mine, ⅓ mile north of Phillipston Station, Brady township.
30. Ben Adhem Coal Company. Ben Adhem mine, at Sligo, Piney township.
31. Sunnyside Coal Company. Sunnyside mine, 1 mile south of Sligo, Piney township.
32. Pennsy Coal Company. Alsace No. 12 mine, on N. Y. C. R. R., 2½ miles southwest of Reidsburg, Monroe township.
33. Orchard Coal Company. Orchard mine, 2½ miles southwest of Reidsburg on N. Y. C. R. R., Monroe township.
34. Harley Hankinson Company. Glen Valley mine, on N. Y. C. R. R., 2½ miles southwest of Reidsburg, Monroe township.
35. Sloan Coal Company. Sloan mine, 1 mile southwest of Clarion, Clarion township.
36. Harvey Coal Corporation. Harvey mine, 3 miles southeast of Clarion, Clarion township.

37. L. E. F. & C. Co. Adell mine, 1½ miles southeast of Clarion, on L. E. F. & C. R. R., Clarion township.
38. Eureka Coal Company. Walters mine, at Strattonville, Clarion township.
39. Liberty Mining Company. Thatcher No. 1 mine, ¾ mile east of Strattonville Station, Clarion township.
40. W. R. Calverley, Inc. Gordontown No. 4 mine, 1 mile southeast of Strattonville, Clarion township.
41. Rose Valley Fuel Corporation. Marshall No. 1 mine, 1 mile southeast of Strattonville, Clarion township.
42. W. R. Calverley, Inc. Nickle Plate mine, ½ mile northeast of Gordontown Station, Clarion township.
43. W. R. Calverley, Inc. Rodgers No. 3 mine, ¼ mile south of Gordontown, Clarion township.
44. D. A. McDonald. McDonald mine, 2 miles northeast of Strattonville Station, Clarion township.
45. Brush Run Fuel Company. Brush Run mine, 1 mile west of Waterson Station, Clarion township.
46. F. W. Sherry. Baldauf No. 1 mine, 1 mile northwest of Waterson Station, Clarion township.
47. Ross Mining Company. Ross mine, 1 mile northeast of Waterson Station, Clarion township.
48. Summerville Coal Company. Summerville Nos. 1 & 3 mines, at Holden Station, Limestone township.
49. Madill Coal Company. Holden mine, near Holden Station, Limestone township.
50. Outcrop on L. E. F. & C. R. R., ¼ mile south of Holden Station, Limestone township.
51. Williams Coal Company. Williams mine, ½ mile south of Holden Station, Limestone township.
52. Fairman Coal Company. Fairman mine, ½ mile south of Holden Station, Limestone township.
53. W. R. Calverley, Inc. Alton No. 7 mine, 2 miles northwest of Summerville, Limestone township.
54. Mercer Iron & Coal Company. Sutton No. 10 mine, ⅕ mile west of Sutton Station, Limestone township.
55. Wallwork Coal Company. Hawthorn No. 1 mine, 1½ miles northeast of Hawthorn, Redbank township.
56. Fairmount Coal & Coke Company. Fairmount No. 11 mine, 1 mile northeast of Hepler Station, Redbank township.
57. Fairmount Coal & Coke Company. Fairmount No. 12 mine, at Fairmount City, Redbank township.
58. Beattie Mining Company. Beattie No. 2 mine, 1 mile east of New Bethlehem, Redbank township.

MIDDLE KITTANNING (C) COALS.

The two Middle Kittanning coals, which lie about 60 and 75 feet above the Lower Kittanning, are very irregular, but locally reach a maximum thickness of 2 feet 6 inches; one or the other is generally absent. North of Clarion River the Middle Kittanning is very thin, and entirely lacking in large areas. South of Clarion River the bed averages 16 inches thick, but is not persistent. At Mount Airy the bed is separated into two benches by 18 inches of shale; the lower bench is 4½ inches thick, and the upper one 1 foot 9 inches thick. On Redbank Creek it is locally 2 feet 6 inches thick, and is mined by farmers.

UPPER KITTANNING (C′) COAL.

The Upper Kittanning coal, lying about 110 feet above the Lower Kittanning, is so variable in thickness that it is called the pot vein. North of Clarion River it is thin, locally reaching minable thickness two miles north of St. Petersburg.

South of Clarion River the Upper Kittanning varies from a few inches to 4 feet in thickness within a few yards. It may be minable one mile east of West Freedom, where it is 1 foot 9 inches thick, including a 2-inch shale parting near the middle of the bed. It reaches a local maximum thickness of 3 feet 5 inches one mile northeast of New Athens, and is good clean coal. Near New Bethlehem the Upper Kittanning is from 3 to 4 feet thick in a considerable area.

LOWER FREEPORT (D) COAL.

The Lower Freeport lies about 165 feet above the Lower Kittanning. It is probably entirely eroded north of Clarion River and is contained only in the highlands south of that river. Its area is greater, and its thickness more regular than the Upper Freeport, but it is thin and carries numerous partings. It is mined commercially in Toby, Porter, and Redbank townships.

In Toby township the Lower Freeport bed averages 3 feet 6 inches thick, including a thick shale parting near the middle. The top bench ranges from 11 to 18 inches thick, and the bottom bench from 15 inches to 1 foot 8 inches thick. Locally the bed occurs in four benches separated by bone partings ranging from ¼ inch to 1½ inches thick.

In Porter township, in the vicinity of New Bethlehem, the Lower Freeport coal occurs in a single bench ranging from 3 feet 10 inches to 6 feet thick. North of New Bethlehem the bed is split into two benches by a shale and bone parting ½ inch to 12 inches thick. The top bench ranges from 12 inches to 4 feet thick, and the bottom bench from 2 feet 6 inches to 6 feet thick.

In the vicinity of Fairmount City, in Redbank township, the Lower Freeport occurs in a single bench 6 feet thick.

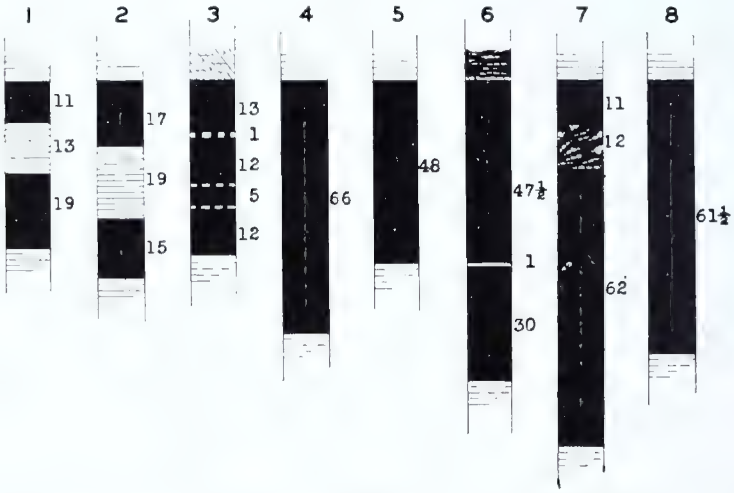


Figure 58. Sections of Lower Freeport coal in Clarion County.

1. Outcrop 2 miles northeast of Upper Hillville, Toby township.
2. Outcrop 3 miles northeast of Upper Hillville, Toby township.
3. Outcrop on Black Fox Run, near Bela, Toby township.
4. Abandoned country bank at New Bethlehem, Porter township.
5. Country bank, ½ mile north of New Bethlehem, Porter township.
6. Outcrop 3½ miles north of New Bethlehem, Porter township.
7. Outcrop 3 miles north-northwest of New Bethlehem, Porter township.
8. Outcrop at Fairmount City, Redbank township.

UPPER FREEPORT (E) COAL.

The Upper Freeport coal lies about 200 feet above the Lower Kittanning and 40 feet above the Lower Freeport. Its area is confined to some 50 hilltops along the southern border of the county. It ranges from 18 inches to 6 feet 3 inches thick, not including persistent bony benches above and below the good coal. Next to the Lower Kittanning and Clarion coal, it ranks third in importance in the county, and is persistent and minable in practically its entire area.

The Upper Freeport is mined commercially at one locality in Perry township. It occurs in three benches separated by shale partings ½ to 1 inch thick. The top bench ranges from 10 to 18 inches thick.

In Toby township the bed varies much in physical character, but averages approximately 3 feet thick. In the vicinity of Upper Hillville it occurs in a single bench 2 feet 4 inches to 2 feet 10 inches thick. In Rimersburg the bed is thicker, but is separated into numerous benches by 1-inch shale partings.

The chief importance of the Upper Freeport in Clarion County is in Madison township, where it is being mined commercially at many localities. The bed is very irregular in thickness and physical character. It occurs as a single bench in some localities, and in others it is split into as many as four benches by shale and clay partings ranging from a knife blade in thickness to 12 inches. The minable coal averages over 4 feet thick in this township.

The Upper Freeport is being mined in the vicinity of New Bethlehem in Porter township, where it occurs in a single bench 4 feet thick.

Two commercial mines are working the Upper Freeport in Redbank township in the vicinity of Fairmount City. The coal averages 4 feet thick and occurs in two benches separated by a bony coal parting 2 inches thick. The top bench ranges from 1 foot 10 inches to 3 feet 4 inches thick. The bottom bench ranges from 10 inches to 2 feet thick.

The following sections are characteristic of the Upper Freeport coal in Clarion County:

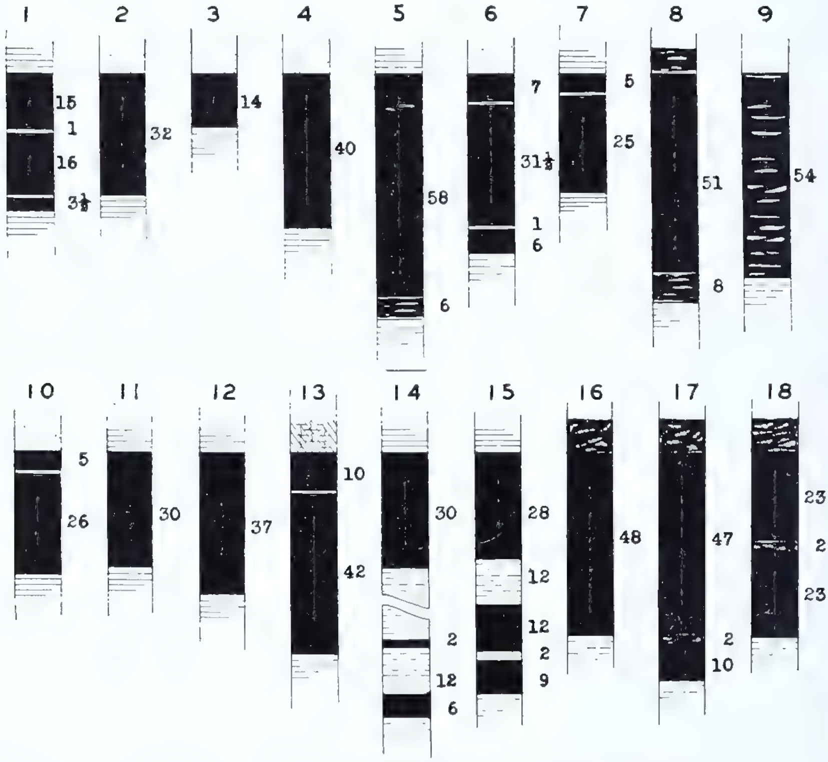


Figure 59. Sections of Upper Freeport coal in Clarion County.

1. Outcrop 1 mile northeast of Dutch Hill, Perry township.
2. Outcrop 3½ miles northeast of Upper Hillville, Toby township.
3. Outcrop 1 mile northwest of Kissingers Mill, Madison township.
4. Outcrop 1 mile northwest of Kissingers Mill, Madison township.
5. Outcrop 1½ miles northwest of Rimersburg, Toby township.
6. Outcrop 2 miles west of Rimersburg, Toby township.
7. Outcrop ½ mile south of Rimersburg, Madison township.
8. Outcrop 1 mile southwest of Maple Grove, Madison township.
9. Outcrop ½ mile northeast of New Athens, Madison township.
10. Outcrop at New Athens, Madison township.
11. Outcrop ¾ mile north of New Athens, Madison township.
12. Outcrop at Sandy Hollow, Madison township.
13. East Brady Coal Company. East Brady mine, 1 mile southeast of Sarah Furnace, Madison township.
14. Outcrop at Redbank Furnace, Madison township.
15. Outcrop on hill 1½ miles north of Lawsonham, Madison township.
16. Outcrop on hill ½ mile northeast of New Bethlehem, Porter township.
17. Outcrop on hilltop east of Middle Run, 1½ miles northeast of Fairmount City.
18. Country bank 3 miles northeast of Fairmount City, Red Bank township.

CONEMAUGH COALS.

The Conemaugh group has been eroded in all of Clarion township with the exception of small isolated areas in the townships bordering on Redbank Creek. The Mahoning, Brush Creek, and Bakerstown coals average about 6 inches thick and are not minable.

CHAPTER X.

CLEARFIELD COUNTY.

BY GEORGE H. ASHLEY

INTRODUCTION.

Clearfield County was the first in the bituminous fields to send coal into eastern Pennsylvania. In 1785 Samuel Boyd got the idea of furnishing coal to the eastern market, and on November 1 of that year took up and patented the then new purchase from the Indians, a tract of land along Susquehanna River about three miles above Chincleclenoose, now the town of Clearfield. His son, William Boyd, later a member of the State Senate, in the adventurous enterprise of youth built an ark in 1803 and in the spring of 1804 loaded this ark with coal and sent it down the river to Columbia, a distance of 260 miles. About the same time John Jordon of Clearfield sent down an arkload of coal taken from a bed in the bottom of the river about one mile above Clearfield. From that time on the building of arks and mining of coal occupied many of the inhabitants of Clearfield during the winter seasons, and in the spring this coal was sent to the eastern markets. In 1813 P. A. Karthaus began mining coal at the mouth of Little Moshannon Creek. In 1828 he began sending coal to Philadelphia by way of Port Deposit and thence by sloop through the Chesapeake and Delaware canal. This coal sold at 33 cents a bushel. Mr. Karthaus also sent coal to Baltimore and to the Schuylkill and Philadelphia by way of the Union canal. Later the famous Moshannon or Lower Freeport bed was discovered in the region of Philipsburg and Morrisdale. It is said that still later a saw mill established near Houtzdale brought coal from Philipsburg for the boiler; it was afterward found that the mill was only five feet above the outcrop of the famous Moshannon bed. During the sixties a large development of the Moshannon basin from Morrisdale to Houtzdale occurred, and the coal from this district established the high reputation that Clearfield coal has ever since enjoyed. Extensive development of the county has, however, had to wait for the extension of railroad lines. In the early eighties a branch of the Pennsylvania Railroad crossed the mountains to Osceola Mills and extended to Philipsburg, Clearfield, and Curwensville with mining branches to Houtzdale and other lines northwest from Houtzdale, Osceola Mills, and Philipsburg. Also another branch leaving the main line at Bellwood entered the county from the south and reached the position of Coalport or Irvona. The low grade division of the Pennsylvania Railroad crossed the northwest corner of the county. About that time the Buffalo, Rochester, and Pittsburgh Railroad was built, and since that time lines have been extended to cover most of the southern part of the county. The line down the West Branch of Susquehanna River has been built only in recent years. The northern half of the county is still sparsely settled and nearly lacking in railroad transportation.

Between fifteen and eighteen coal beds are found in the county. Several of these are of limited extent and of uncertain correlation. There appear to be not less than 12 and possibly 15 beds in the Allegheny group. Of these the most important are the Upper and Lower Freeport, Lower Kittanning, and Brookville or Clarion coals. The coal of this county is generally tender and shipped as run-of-mine. The coal of the southeastern two-thirds of the county goes eastward to tidewater. The coal of the northwestern third of the county goes northward to western New York, or turning eastward to eastern New York and New England.

The county is in a mountainous part of the State, the Allegheny Front lying but a short distance east of Moshannon Creek which forms the eastern boundary of the county. The county is characteristically a plateau country with broad sublevel divides, and as a rule narrow, steep-sided valleys. Most of the farms are on the uplands. Many of the valleys are only wide enough for a highway or a highway and railroad. Most of the older settlements are on the upland where the farming land lies. Where an extension of Chestnut Ridge crosses the northern part of the county the land is about 2200 feet above sea level. Most of the uplands are between 1700 and 1900 feet above sea level. The main drainage is principally between 1,000 and 1,400 feet above sea level.

STRUCTURE

The county is crossed from southwest to northeast by three principal synclines, separated by two strong anticlines and bordered on the southeast by the monocline of the Allegheny Front and by a strong anticline on the northwest. The first basin, called in this region Houtzdale syncline, enters the county in the region of Muddy Run, turns northeastward through Ramey, Houtzdale, Osceola Mills, and Philipsburg. In the center of this syncline the Lower Freeport coal has an elevation commonly of less than 1500 feet, but rising somewhat to the northeastward. This syncline is much broken with faults that displace the coal beds in many places from 50 to 100 feet or more. To the southeastward the Lower Freeport coal rises on the flank of Allegheny Mountain to a theoretical elevation of 2700 feet or more with a dip of 300 or 400 feet to the mile. Laurel Hill anticline enters the county about in the middle of the south boundary. It noses down in the region of Irvona, becoming rather indistinct, but rises again toward McCartney. The axis passes north of Belsena Mills, near Jeffries, and Burly, between Bigler and Wallaceton. It has not been traced accurately beyond this point, but is supposed to extend northeastward about to the mouth of Moshannon Creek. Where the anticline enters the county the Lower Freeport coal has an elevation of 1900 feet, but descends to 1650 feet at Irvona. It then rises and forms a high dome in the region of Burly, reaching an elevation of 2150 feet. In this region the Allegheny coals are practically all eroded, the so-called Mercer flint clay, lying close to the surface in the center of the anticline. This dome is broken up with faults, some of which have a displacement of from 100 to 200 feet. The crest of the anticline is therefore very irregular. From this high crest the anticline drops so that the Lower Freeport coal north of the railroads between Bigler and Wallaceton is at 1900 feet.

West of Laurel Hill anticline across the southern part of the county, lies a broad area structurally low, without pronounced axis. The Barnesboro syncline enters the county west of Westover but disappears before crossing the Bellwood branch of the Pennsylvania Railroad. Nolo anticline barely crosses the southern border of the county a little east of the southwest corner. Brush Valley syncline enters the county north of Cherry Tree and can be traced as far as Mahaffey. The probable extension of this syncline appears again near Lumber City and becomes a pronounced syncline in the Clearfield region where it is known as Clearfield syncline. This syncline which has not been traced accurately, forms the basin which extends to the corner of the county where the northeast boundary meets the West Branch of the Susquehanna. Between Mahaffey and McCartney the dips are very gentle and the structure may best be described as rolling. A slight dome exists west of Chest Creek between New Washington and Westover, and a similar but smaller dome between New Washington and Mahaffey. A slight dome also is found south of the West Branch southeast of Lumber City. The Lower Freeport coal in all these domes is 1550 feet above sea level. The general level for that bed in that part of the county is between 1400 and 1550. In the Curwensville region the Lower Freeport bed drops to 1350. Its elevation northeastward from Clearfield is not known. From this broad flat the rocks rise to the west or northwest to Chestnut Ridge anticline, which in this region is a pronounced structure. The Lower Freeport coal rises from 1450 feet near Mahaffey to 2050 feet at the corner between Jefferson, Indiana, and

Clearfield counties. Extending northward and eastward, the rocks rise until the position of the Allegheny group is above the level of the table land and the coals of that group have been removed by erosion. The general flat top of the table land across northern Pike, Lawrence, Goshen, Girard, Covington, and Karthaus townships is underlain by Pottsville sandstone, and the streams cut into the underlying Mississippian rocks. The northwest corner of the county is crossed by Punxsutawney syncline, which preserves workable coals in the region of DuBois and Penfield. This basin rises toward the northeast so that in the Penfield region the upper coals have been partially eroded.

The 32 sections in Figures 60, 61, and 62 are nearly all combined or generalized sections, made up of measurements at or near the point mentioned, which were checked, and in some instances supplemented by drill records.

Many of the coal sections are the average of several measurements.

The following figures illustrate the variation in the sequence of beds:

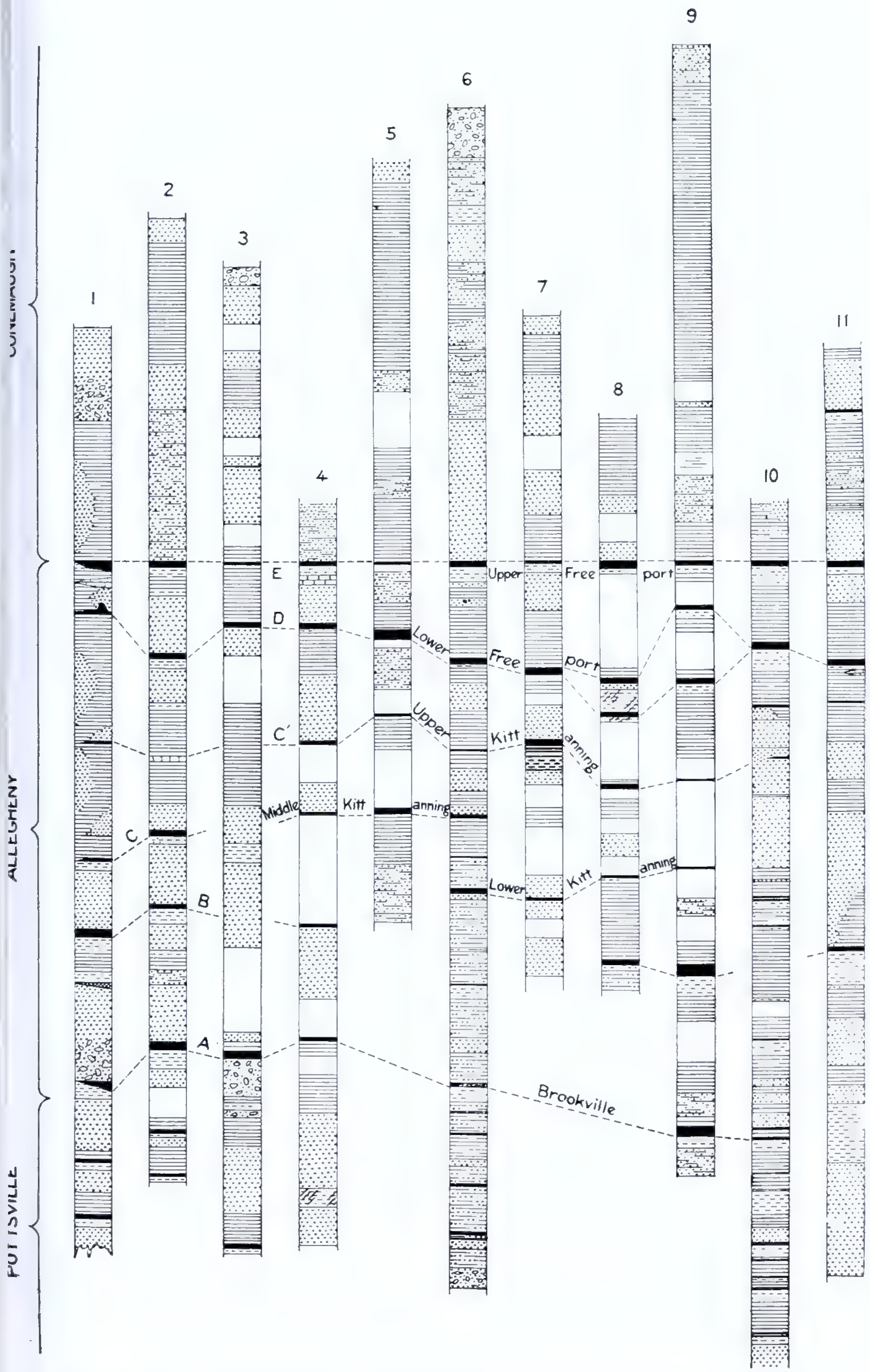


Figure 60. Stratigraphic sections in western Clearfield County.

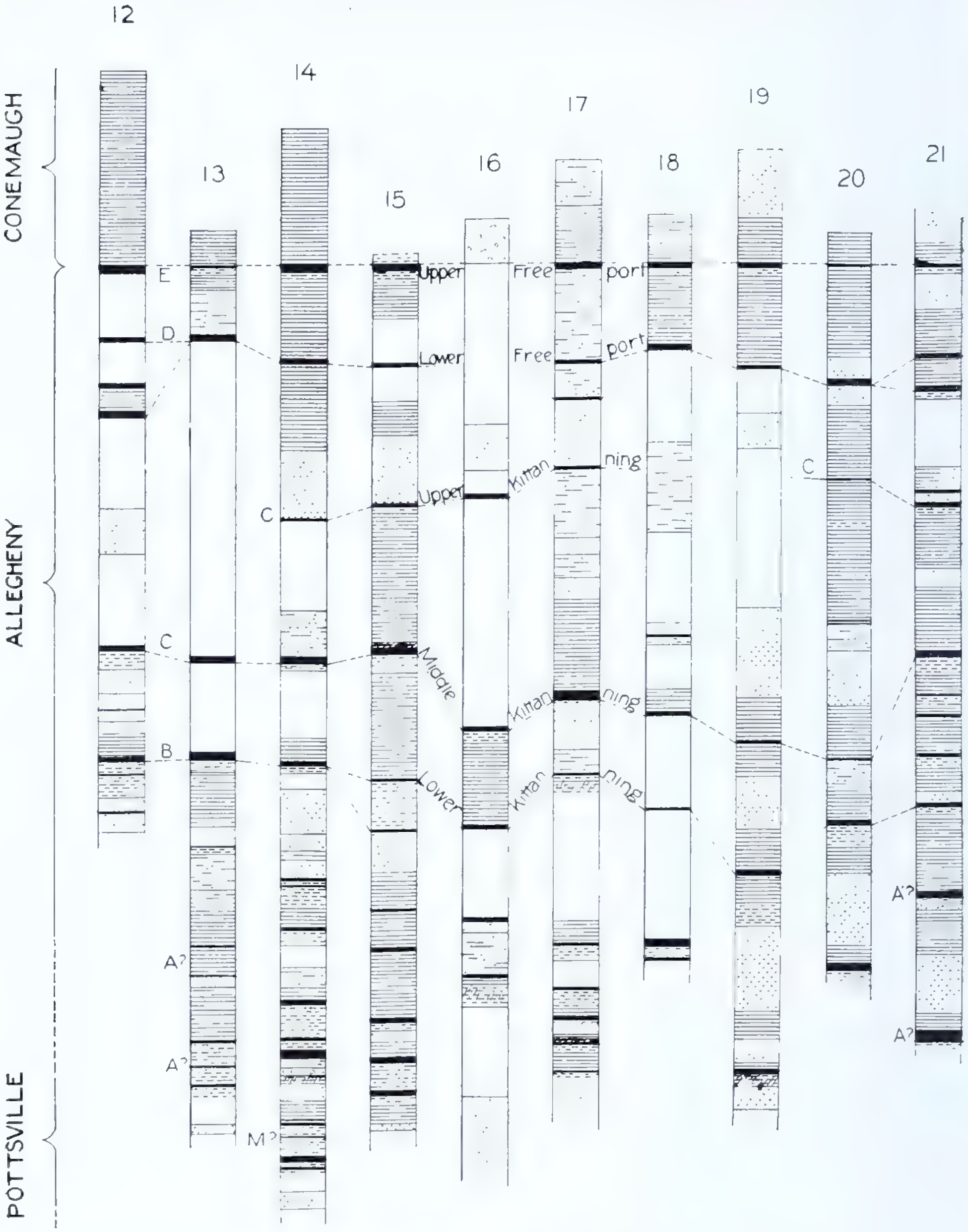


Figure 61. Stratigraphic sections in the central part of Clearfield County.*

1. Section in Newtonburg region.
2. Section in Mahaffey and McGees Mills area.
3. Section near Bells Landing.
4. Section at Lumber City.
5. Section near Kermoor.
6. Section in Gazzam-Ansonville region.
7. Section near Westover.
8. Section at and south of McCartney.
9. Section near Coalport.
10. Section of Carnwath area.
11. Section of bluffs south of Curwensville.
12. Section at Susquehanna Bridge and Carbon mine.
13. Section at Riverside and Coal Hill south of Clearfield.
14. Section vicinity of Clearfield.
15. Section in Leonard and Fairmount area east of Clearfield.
16. Section at Krebs.
17. Section of bluff at toe of big bend north of Dimeling.
18. Section at Oshanter.

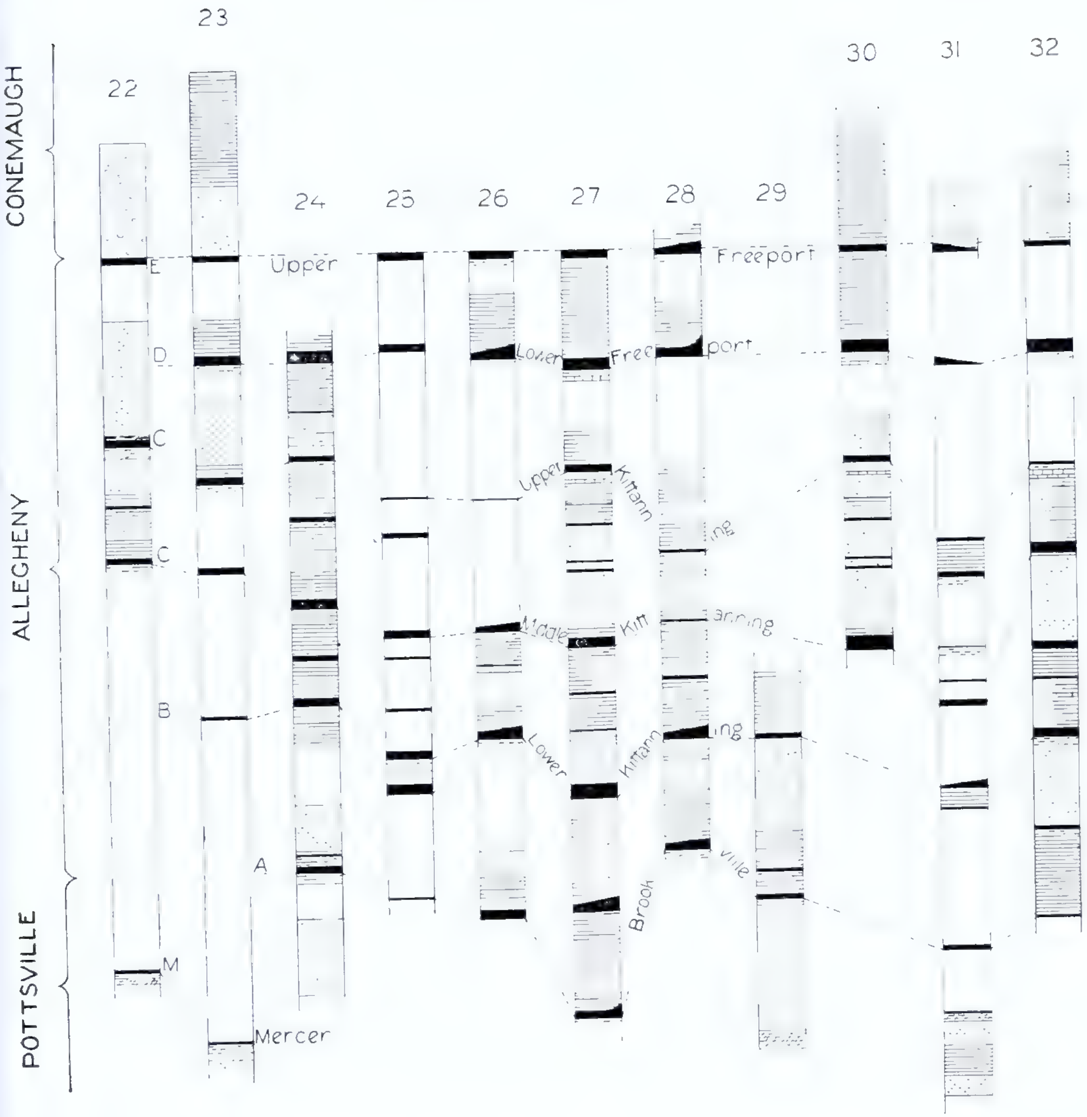


Figure 62. Stratigraphic sections in eastern Clearfield County.

19. Section in region of Faunce.
20. Section in region of Boardman.
21. Section in Muddy Run region.
22. Section near Mineral Spring and Plane mine.
23. Section west of Bigler.
24. Section at and near Graham Station.
25. Section near Gearhartsville.
26. Section near Osceola Mills.
27. Section at Houtzdale.
28. Section near Amesville.
29. Section near Jeffries.
30. Section at Morrisdale.
31. Section in Goshen township.
32. Section at Karthaus.

STRATIGRAPHY.

The greater part of the county is underlain by rocks belonging to the Allegheny group. Rocks of Conemaugh age make the hilltops in each of the principal basins and in the northwestern part of the county 300 or 400 feet of these rocks are preserved in the highest hills. As already stated, over the crest of the Chestnut Ridge anticline eastward from Anderson Creek the Allegheny rocks are largely removed and the surface rocks consist of the Pottsville sandstones with rocks of Mississippian age exposed in the valleys. Mississippian rocks are also exposed on Laurel Hill anticline along Clearfield Creek and on the flank of Allegheny Mountain along Moshannon Creek. Devonian rocks are not exposed in outcrop but have been drilled into for gas, oil, or water.

The following generalized section has been made by combining sections of air shafts at Houtzdale with the section of a shaft to the B coal and drill holes below the B coal, and will serve as a detailed section of the Allegheny group in Clearfield County.

Section of Allegheny group at Houtzdale.

	Ft.	in.
Coal; Upper Freeport, "cap seam"	3	
Shale	20	
Sandstone and shale	5	
Shale	2	
Sandstone	1	
Shale		9
Sandstone		6
Shale	4	
Coal		10
Shale, black	2	6
Sandstone		6
Shale, black	1	
Coal; Lower Freeport (Moshannon, D)	5	
Clay	1+	
Interval to top shaft	13	8
Surface material	14	5
Sandstone	1	
Shale	32	2
Coal	1	2
Shale	4	6
Coal and shale	1	3
Shale	16	5
Sandstone	38	
Shale	1	2
Coal	3	
Clay	1	5
Shale	14	5
Coal		5

Clay				5
Shale			14	
Coal				8
Shale			18	5
Coal; Lower Kittanning, B				
	Ft.	in.		
Coal	2			
Shale		8		
Coal	1	2	4	1
Bottom of shaft.				
			Ft.	in.
Shale			1	6
Sandstone			4	4
Clay			2	
Sandstone conglomerate			4	
Coal				3
Clay			4	
Sandstone			14	3
Shale			18	6
Coal; "3-foot"				
	Ft.	in.		
Coal		8		
Shale		2½		
Coal	2	1½	3	
Shale			1	
Shale			10	9
Clay shale			12	8
Sandstone			7	8
Shale			2	
Shale and clay			2	
Shale with coaly streaks				5
Sandy shale				5
Coal and shale partings			6	11
Sandy shale			1	
Sandstone, Pottsville			3+	

There is, of course, much variation in the county in the thickness of the beds and in the intervals between them. Of the smaller beds indicated in this table the bed only a few feet above the Lower Kittanning or B coal is believed to correlate with the Bens Creek coal of Cambria County. One of the coals between the Upper and Middle Kittanning was given the name Gorman coal by the Pennsylvania Second Geological Survey. The other extra beds have not been named. In parts of the county a number of small beds occur from 70 to 130 feet below the Lower Kittanning coal. Whether these represent the Clarion and Brookville coals much split up and spread apart, or whether they represent coals and shales in the position of the Homewood sandstone in this area is not certain. As best judged by intervals they seem to occupy the space between the Brookville and Mercer coals. The lower of these coals may be considered as Mercer, and the uppermost possibly as Brookville, or Clarion. In a section to be quoted, exposed in outcrop at the toe of the long bend of Clearfield Creek north of Dimeling the clay under the uppermost of the coal beds is very fossiliferous, and these fossils were found by Mr. Harvey Bassler to correspond with those under the Pardoe coal of Mercer County. The Pardoe coal is believed to lie directly on top of the Homewood sandstone. Largely on this correlation it is here assumed that these small beds represent the upper part of the Pottsville and the basal part of the Allegheny.

One of the problems still unsettled in this area is the stratigraphic position of the flint day which is very extensively mined. The simplest solution is to assume that there are flint clays at three or more horizons in the lower Allegheny or upper Pottsville. One of these is believed to be under the Lower Kittanning coal and in the position of the flint clay in Clarion town which there lies between the Lower Kittanning coal and the Vanport limestone. A second flint clay is in the upper part of sections including these several small coal beds, and would seem to be at the position of the clay under the Brookville coal. However, at many of the flint clay mines of south-central Clearfield County the distance from the Lower Kittanning coal and the presence over the clay of a thick massive sandstone, which is thought to represent the Homewood, would indicate that there is a third horizon corresponding with the position of the Mercer coals, limestones, and clays of the Beaver River Valley.

The following section just above the railroad station at Clearfield shows several of these beds, the uppermost bed being 102 feet below what is thought to be the Lower Kittanning or B coal.

Section at Clearfield Station.

	Ft.	in.
Coal, outcrop		
Clay, light drab	5	
Clay or shale, hard and flint-like	4	
Clay, light drab	5	
Coal ....6 inches to	2	
Clay, drab ....4 feet to	6	
Coal ....0 to		3
Clay with nodular iron concretions	2	
Clay with a few iron ore concretions	4	
Iron ore concretions		6
Clay, hard flinty	3	
Sandstone, irregular, thin-bedded, medium-grained, brown to gray	7	6

Shale, dark drab chip ....6 feet to	10	
Coal, grading into black shale ..14 inches to		8
Clay, light to dark, hard and yellow, ...	5	6
Coal ....18 inches to		9
Clay, bluish drab	8	
Coal ....0 to		2
Clay, hard, dark, shaly	1	4
Coal		6
Clay to railroad tracks	1+	
Hidden	7	6
Sandstone, thin-bedded and irregular bedded to river	8	

The varying thickness of the coals and other beds is shown by measurements made at points along the cliff, in some instances 200 or 300 feet apart. The uppermost coal of the series is 68 feet above the top of the massive sandstone showing in the river bed. Similar successions of coal beds were measured, as stated, at the bend of Clearfield Creek north of Dimeling, at Leonard Station, at Coal Hill near Clearfield, at Carnwath, and elsewhere. The section north of Dimeling is as follows:

Section of coal measured at toe of Clearfield Creek north of Dimeling.

Shale	10+	
Coal		10
Clay, containing fossils	6	
Sandstone	12	
Coal	1	5
Clay	8	
Shale	3	
Coal	2	2
Clay	1	
Sandstone	2	
Bone	1	6
Coal		3
Clay	3	
Shale	9	
Coal		6
Clay	3	
Sandstone	10+	

In the Leonard region the coals and intervals are as follows:

Section of coal measured near Leonard Station.

		Ft.	in.
Coal; Middle Kittanning or C			
Bone	1		
Shale ....1 inch to	1	4	
Coal	3		

Interval, practically all shale		45	
Clay		6	
Drab shale		12 to 15	
Clay		22	
Coal, Lower Kittanning or B		2	
Clay		7 to 9	
Interval, clay, sandstone, and shale		50	
Coal			6
Interval, shale		16	6
Coal			2
Interval, clay and shale		33	
Coal		2	6
Interval, clay, sandstone and shale		16	
Coal:			
Bony	1		
Coal	2	3	
Interval, sandstone, clay, and shale		22	
Coal		1	
Shale		8	
Irregularly bedded sandstone		10+	

Coal Beds in Clearfield County.

Group	Name of bed	Average interval	Average thickness	
			Ft.	in.
Conemaugh 250	Bakerstown		thin	
		130		
	Brush Creek		thin	
		45		
	Mahoning		thin	
		65		
Allegheny 290	Upper Freeport (E)		2	6
		40		
	Lower Freeport (D)		3	
		60		
	Upper Kittanning (C′)		2	
		55		
	Middle Kittanning (C)		2	
		45		
	Lower Kittanning (B)		2	6
		90		
	Brookville (A)		1	6
		50		
Pottsville (Kanawha) series 180	Mercer		1	

In addition to these more regular coals there are frequently found between the Upper Kittanning and Lower Kittanning two or three additional beds, frequently one or more additional beds appear between thhe Lower Kittanning and the Brookville, and in the center of the county a group of irregular thin coals whose exact correlation is as yet somewhat in doubt, but which appear to replace the Homewood sandstone that commonly occupies the upper 40 to 60 feet of the Pottsville. A few sections will indicate the position of some of these minor coal beds.

COAL BEDS.

MERCER COALS.

The lowest coals in the county appear to be 330 to 350 feet below the Upper Freeport bed, or at what would appear to be the position of the Mercer coals in the Beaver River section. Coals are seen in many parts of the county at this position just above flint clay mines. As a rule coals at this position are only a few inches thick, but in many places reach 18 inches, and in a few places 2 feet and over, notably at Faunce and west of McGees. At the latter place there are two beds each of which reaches possible workable thickness.

BROOKVILLE (CLARION ?) COAL.

The Brookville coal is or has been mined around McGees, Oshanter, Boardman, Belsena, Madera, on Upper Morgan Run and Upper Moshannon Creek, around Osceola, and Blue Ball (West Decatur P. O.), and in some other areas. Although the coal is designated Brookville, exact correlation is not implied. Detailed stratigraphic studies may later show that the coals here called Brookville are not all at the same horizon, and the horizon at which most of the coal occurs may some day prove to be Clarion.

This bed has been extensively mined in Bell township where it is about 4 feet thick. The mines are close to water level around McGees Mills and westward up Bear Run. The coal rises above Susquehanna River between McGees and Mahaffey, and keeps above the level of Bear Run to well toward the heads of that stream. (Sections 1 to 5, Fig. 63). The coal is commonly broken by partings of shale or bone.

East and north of Mahaffey what is thought to be the same bed, rises to outcrop above Chest Creek and down Susquehanna River. As far as seen it appears to be thin, (sections 6 to 9), until Waukesha is reached on Chest Creek and Bells Landing on the river. Here it becomes of workable thickness (sections 10 and 11).

Around Lumber City, Curwensville, and to the southward the coal is irregular, but locally reaches a thickness of 3 feet.

Up Little Clearfield Creek around Oshanter and beyond, this bed is from 3 feet to 3 feet 6 inches thick and has been mined or opened at several places. (Sections 34 to 37, Fig. 64). Around Boardman the A coal is extensively worked, and locally called the B. It is about 3 feet 6 inches thick with one parting 20 inches from the bottom. The A bed is opened on Pine Run and around Belsena Mills, where it is about 4 feet thick. Continuing up Clearfield Creek to Madera the A coal is of good thickness, commonly with one or two partings. It is from 3½ to 4½ feet thick. (Sections 22 to 27, Fig. 63). Northeast of Madera on the branches of Morgan Run this bed is of variable thickness but widely workable. (Sections 20 and 21, 30 and 34).

The Brookville or A coal is mined on Moshannon Creek at Ladysmith and other mines where it is in two benches, the upper 3 feet thick and the lower 17 inches to 1 foot 7 inches thick, the parting being shale or sandstone 10 or 12 inches thick. (Sections 25 and 26, Fig. 64). The A bed is mined around Osceola Mills where it is about 3 feet 6 inches thick. (Sections 32 and 33, Fig. 63). Again, above Blue Ball it is worked at the Red Jacket and other mines, and has been opened at many places in that neighborhood. (Sections 35 and 36). The thickness ranges up to 5 feet, but the coal is variable, commonly having benches split off and separated by a foot or more of shale or bone. At one place the thickness changes abruptly from 5 feet to 18 inches within a few yards.

The northern and eastern parts of the county have not been studied in detail geologically, and little is known of the coals there. Coals correlated as the A are mined in Graham and Cooper townships (sections 38 to 40) where reported the coal is from 3 feet to 6 inches thick.

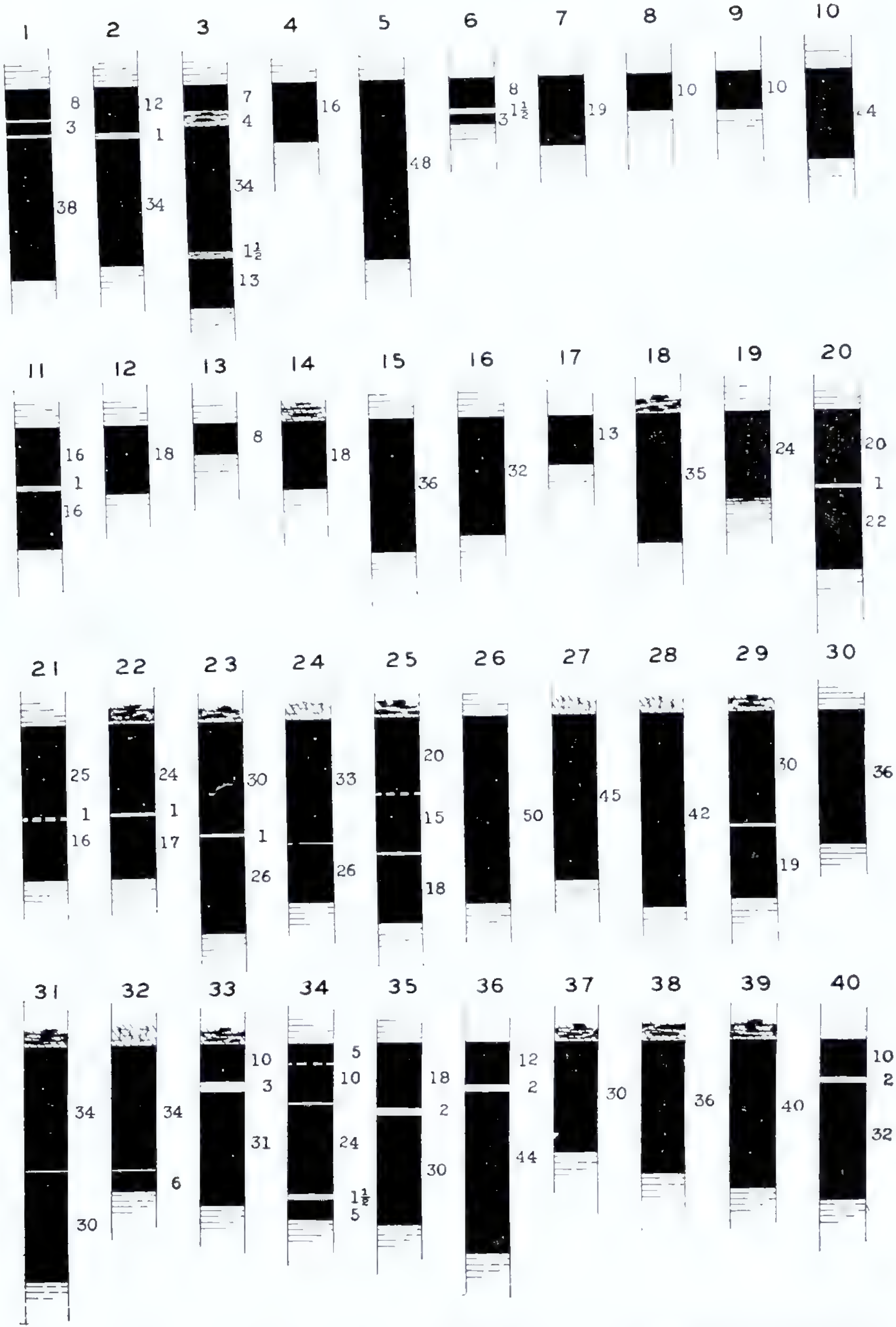


Figure 63. Sections of Brookville coal in Clearfield County.

1. Outcrop on Bear Run, 1¾ miles southwest of McGees Mills, Bell township.
2. Mine, on Bear Run 2¼ miles west of McGees Mills, Bell township.
3. Outcrop ¼ mile east of McGees Mills, Bell township.
4. Outcrop, 1½ miles south of McGees Mills, Bell township.
5. Outcrop, 1 mile northwest of Mahaffey, Bell township.
6. Outcrop 1 mile north of Mahaffey, Bell township.
7. Outcrop 2 miles east of Mahaffey, Bell township.
8. Outcrop at Bethlehem, Bell township.
9. Outcrop at La Jose, Burnside township.
10. Outcrop, 1 mile northwest of Waukesha, Chest township.
11. Outcrop at Bells Landing, Greenwood township.
12. Outcrop opposite Lumber City, Ferguson township.

13. Outcrop 3 miles southwest of Curwensville, Pike township.
14. Outcrop at Olanta, Pike township.
15. Outcrop 2 miles west of Curwensville, Pike township.
16. Outcrop 5 miles northwest of Curwensville, Pike township.
17. Outcrop at New Millport, Knox township.
18. Outcrop 2 miles north of Erhard, Knox township.
19. Outcrop on Clearfield Creek, 1½ miles west of Glen Hope, Beccaria township.
20. Boston Collieries Corp. Mascot No. 2 mine, 3½ miles northwest of Houtzdale, Bigler township.
21. Cassidy Coal Co. Cassidy No. 2 mine, on Morgan Run, 4 miles northwest of Houtzdale, Bigler township.
22. Liberty Coal Mining Co. Bucher mine, 1½ miles north of Madera station, Bigler township.
23. Betz Coal Mining Co. Betz No. 2 mine, 1¼ miles north of Madera station, Bigler township.
24. Liberty Coal Mining Co. Davis mine, 1 mile north of Madera station, Bigler township.
25. Liberty Coal Mining Co. Sylvania mine, ¼ mile west of Madera, Bigler township.
26. Phoenix Coal Co. Banian No. 2 mine, ¼ mile south of Madera station, Bigler township.
27. Phoenix Coal Co. Banian No. 1 mine, ½ mile south of Madera station, Bigler township.
28. Hileman Coal Co. Hileman No. 1 mine, ¼ mile south of Madera, Bigler township.
29. Liberty Coal Mining Co. Corona mine, 1 mile southwest of Belsena station, on Pine Run, Bigler township.
30. Jaffa Coal Mining Co. Florence mine, 4½ miles northwest of Houtzdale, Woodward township.
31. Red Top Coal Mining Co. Red Top No. 2 mine, on Moshannon Creek, 1 mile southeast of Morann, Woodward township.
32. Verdun Coal Co. McAdoo mine, 1½ miles northwest of Osceola Mills, Decatur township.
33. Paragon Coal Mining Co. Burtner No. 2 mine, 3½ miles north of Osceola, Decatur township.
34. Bermoshan Coal Co. Bermoshan No. 2 mine, 3 miles north of Houtzdale, Decatur township.
35. Harris Bros. Coal Mining Co. Red Jacket No. 4 mine, at West Decatur, Decatur township.
36. General Refractories Co. Refractory Colliery No. 1, 1 mile north of Blue Ball, Decatur township.
37. Kristianson and Johnson. Lanse No. 1 mine, at Lance, Cooper township.
38. Winburne Fire Brick Co. Avondale No. 1 mine, 1 mile south of Winburne station, Cooper township.
39. Amestown Coal Co. Amestown No. 1 mine, at Winburne, Cooper township.
40. Acme Coal Mining Co. Beaver Run No. 3 mine, 4½ miles north of Philipsburg, Graham township.

Lower Kittanning or B Coal.

The Lower Kittanning or B coal is probably the most persistent bed in Clearfield County and is widely workable. With the exhaustion of the Moshannon bed in the Houtzdale-Morrisdale basin the B bed has become the principal source of coal being mined in the southeast part of the county.

The B coal is below drainage in Burnside township, but drill holes indicate a persistent thickness of about 2 feet (section 1, figure 64). It is probable that this thickness increases slightly to the eastward through Chest Township. The bed in this township is above drainage along Chest Creek and has been opened in many places, but the coal while minable is too thin to be attractive today (sections 2 and 3).

In Beccaria township the bed is of good working thickness (sections 4 to 12). It is mined extensively around Coalport, Blain, and Irvona, and farther north, lying at good mining height above the level of the bottom lands on Clearfield Creek and its tributaries. The bed is rather badly split up with partings which range from ½ inch to 10 inches in thickness, not including a split that sets in northwest of Irvona in which a 10 inch bench of the bed becomes separated from the other benches by as much as 10 feet of shale.

Along Muddy Run in this township the B bed has a good thickness but is more than 160 feet below creek level and must be reached by shaft. The coal is generally in two benches, each 2 feet or more thick and separated by 4 to 9 inches of shale or bone (sections 13 to 16). These conditions continue eastward into Gulich township (section 17).

Turning north and westward again the B coal is of good thickness and extensively mined around Madera and Upper Morgan Run in Biglow township (sections 19-23). The coal in places is nearly or quite 6 feet thick in two or three benches, in other sections it is reduced to 3 feet or less. Around Houtzdale the B coal is of good minable thickness. It was reached by shaft many years ago at Houtzdale and has workable thickness on Moshannon Creek and on Upper Morgan Run north of Houtzdale. It is below drainage on Beaver Run except where it is brought above drainage on the upthrow side of faults in some of the branches of Beaver Run. Because of faulted conditions of the coal-bearing rocks in this area and to the northeast, uncertainty exists in the correlation of the lower coal beds, and some of the beds locally called B are believed to be the A. A number of sections on Figure 64 drawn on the basis of the local correlations as the B coal are the A, likewise the so-called B coal around Boardman. Sections 29 to 32 of Figure 64 are of the A coal. The B coal has been opened at Carnwath and along Little Clearfield Creek at and above O'Shanter. Most of the sections in this latter area show a solid bed a little over 2 feet. Around Curwensville in Pike township, (sections 38 to 41), the bed is thin, ranging from 13 inches to 3 feet, but has been mined a little and as there are no partings in the bed, it will doubtless furnish considerable coal in the future. Around Grampian and Bell Run in Penn township the bed is workable but hardly averages over 2 feet thick. It may probably be depended upon to maintain that thickness with regularity (sections 40 to 43).

Farther west in Bell township the B coal again is regular but thin, averaging about 2 feet or a little over. The bed so extensively worked in that area (section 45) is the A coal. Measurements of the B bed are given in sections 46 to 49. In Greenwood township the coal so far as seen is thin, not all of it being of workable thickness. In Lawrence township, including the Clearfield region, the coal is barely of workable thickness though locally reaching 3 feet or more. Most sections show about 2 feet. It is exposed almost continuously in the railroad cut between Curwensville and Clearfield. Coming east and south into Decatur township the B bed has considerable thickness though almost everywhere broken up into three benches which may be separated by partings from a fraction of an inch to 1 or 2 feet. As a rule not all of the benches are mined. This is particularly true of the bottom bench as that bench is more likely to be separated from the others by a thick parting. Even without the bottom bench the coal commonly ranges from 3 feet to 4½ feet or more. It is from 63 to 90 feet above the A bed and outcrops in all of the valleys near Osceola and extending down Moshannon Creek to Philipsburg. Near Philipsburg a part of this bed at the Lulu mine is cannel coal. Here it is just above drainage level (sections 53 to 73).

In many of the sections given only the two benches being mined are shown and the third bench is often not reported. This good minable thickness continues northeastward into Morris township where the coal as shown by sections 74 to 79 is from 3 to 4 feet thick. Still farther east in Cooper township (section 80 to 83) this bed continues over 3 feet thick with a bony roof and a main bench from 3 to 3½ feet thick. It is found of minable thickness in Graham township (section 84). Sections 85 to 88 are from Bradford township east of Clearfield. Little is known of the coal in the northern townships, but sections from Goshen and Girard townships (sections 84 to 88) indicate workable coal and some of it nearly 5 feet thick without partings. In Karthaus township in the northeast corner of the county the coal is being mined (sections 97-100). In the northeast corner of the county around Penfield in Huston township the coal is 3 feet thick, solid, with a bony roof in some of the mines.

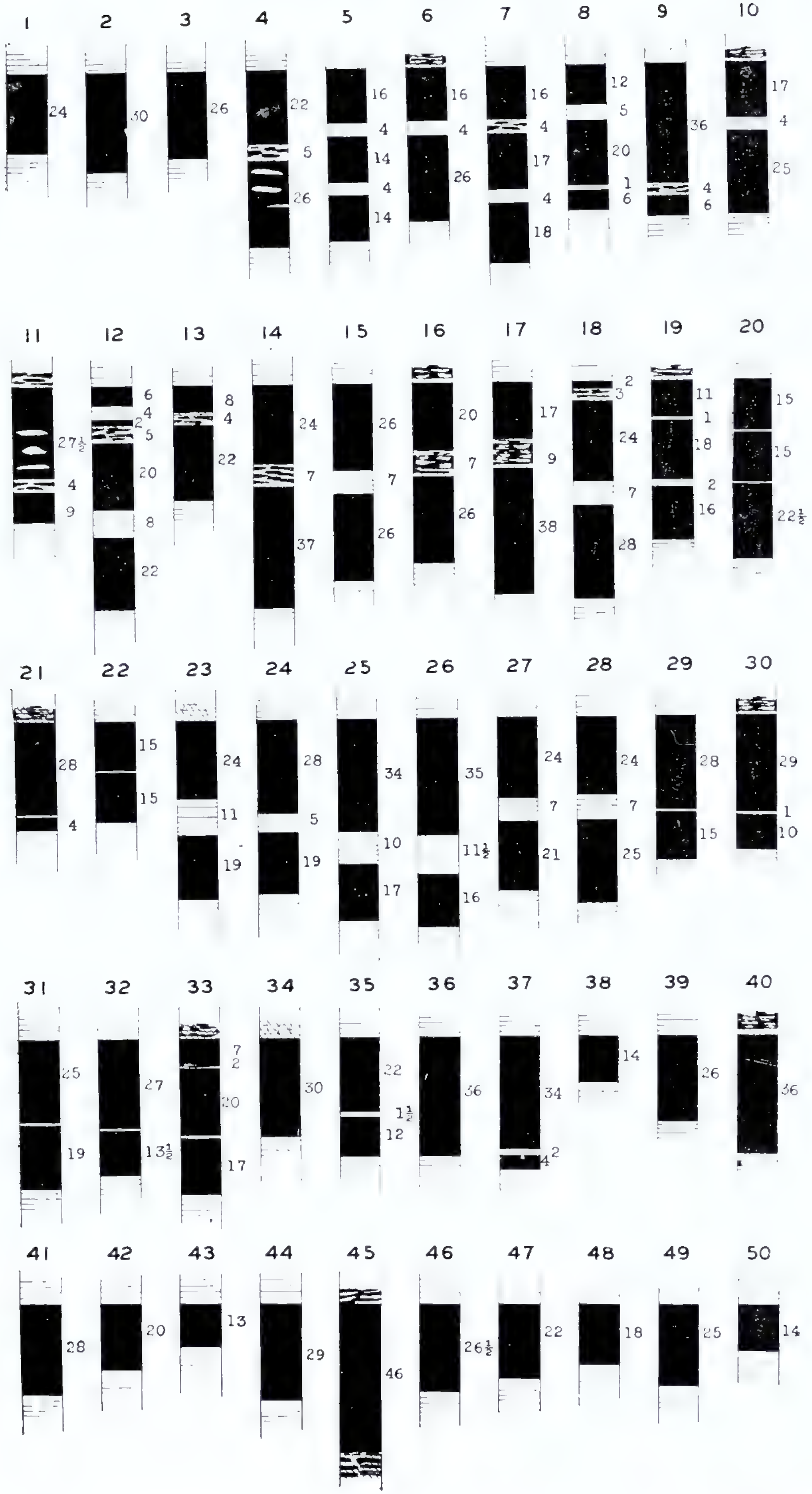


Figure 64. Sections of Lower Kittanning coal in Clearfield County.*

1. Drill hole at Burnside, Burnside township.
2. Outcrop on Chest Creek, 1 mile south of Waukesha, Chest township.
3. Outcrop on Chest Creek, 1½ miles north of Westover.
4. Victor Hill Coal Co. Victor Hill No. 1 mine, 1¼ miles south of Coalport station, Beccaria township.
5. S. Hagert'y Sons. Oakland No. 1 mine, 1 mile south of Coalport station, Beccaria township.
6. Conestoga Coal Co. Conestoga No. 1 mine, 2 miles southwest of Irvona, Beccaria township.
7. S. Hagerty's Sons. Oakland No. 2 mine, ¼ mile west of Coalport station, Beccaria township.
8. Imperial Coal Corp. Cambria Smokeless No. 1 mine, ¼ mile northeast of Coalport Station, Beccaria township.
9. Glen Brook Collieries Co. Glen Brook No. 2 mine, ¾ mile northwest of Irvona, Beccaria township.
10. Turly Coal Mining Co. Wister No. 3 mine, on South Witmer Run, 2 miles southwest of Irvona, Beccaria township.
11. Hiram Swank Sons. Swank No. 2 mine, ¾ mile southeast of Irvona station, Beccaria township.
12. Irvona Coal & Coke Co. Irvona No. 3 mine, ⅕ mile north of Blain City station, Beccaria township.
13. Berwind White Coal Mining Co. Eureka No. 29 mine, 4 miles south of Smoke Run station, on Muddy Run, Beccaria township.
14. W. R. Gallagher & Bro. Black Oak mine, 2 miles southwest of Smith Mills, on top of Allegheny Mountain, Gulich township.
15. S. J. Mountz & Co. Viola No. 1 mine, 1 mile southeast of Smith Mills, Gulich township.
16. Berwind White Coal Mining Co. Eureka No. 28 mine, 1 mile east of Smith Mills, Gulich township.
17. Janesville Coal Co. Fernwood No. 1 mine, ¾ mile northeast of Smith Mills, Gulich township.
18. Hale Coal Co. Elizabeth No. 3 mine, at Ginter, Gulich township.
19. Lena Coal Co. Lena No. 1 mine, 1 mile north of Smoke Run station, Bigler township.
20. Yorkshire Coal Co. Yorkshire mine, 1¼ miles south of Madera, Bigler township.
21. Oxbow Coal Co. Oxbow No. 1 mine, 1½ miles west of Madera station, Bigler township.
22. Liberty Coal Mining Co. Shoff mine, 1¼ miles southwest of Madera station, Bigler township.
23. Maryland Coal & Coke Co. Imperial No. 2 mine, 1 mile northeast of Amesville, Bigler township.
24. Sterling Coal Mining Co. Sterling No. 1 mine, on Moshannon Creek, 3 miles southwest of Coal Run Junction, Woodward township.
25. Atlas Coal Co. Atlas No. 1 mine, 2½ miles south of Houtzdale, on Moshannon Creek, Woodward township.
26. Hale Coal Co. Ladysmith mine, 1 mile east of Morann, on Moshannon Creek, Woodward township.
27. Gasley Coal Co. Gasley No. 2 mine, on Little Beaver Run, 3 miles north of Houtzdale, Woodward township.
28. Stanley Coal Mining Co. Stanley No. 3 mine, 3 miles northwest of Brisbin, Woodward township.
29. Maple Run Coal Co. Maple Run No. 1 mine, 1 mile northeast of Boardman, Knox township.
30. Potts Run Coal Co. Potts Run No. 2 mine, at Boardman, Knox township.
31. Potts Run Coal Co. Potts Run No. 3 mine, ½ mile southwest of Boardman, Knox township.
32. Boardman Coal Mining Co. Boardman No. 4 mine, ½ mile northwest of Boardman, Knox township.
33. Carnwath Coal Co. Carnwath No. 5 mine, at Carnwath, Knox township.
34. B. & B. Coal Co. Sunshine No. 1 mine, at New Millport, Knox township.
35. Clearfield Coal Mining Co. Prospect No. 4 mine, at Olanta, Knox township.
36. Shawnee Mining Co. Shawnee No. 1 mine, on Little Clearfield Creek, 5 miles southwest of Curwensville, Knox township.
37. Robinson Coal Co. Etna No. 1 mine, at Mitchells, Knox township.
38. Outcrop 1½ miles northeast of Lumber City, Pike township.
39. Outcrop at Curwensville, Pike township.
40. Dunlap Run Coal Mining Co. Dunlap Run No. 1 mine, 1 mile south of Devling, Pike township.
41. Outcrop, 1½ miles northwest of Curwensville.
42. Outcrop at Grampian, Penn township.
43. Outcrop on Bell Run, 1½ miles south of Walltown, Penn township.
44. Outcrop in northeast corner of Bell township.
45. South Branch Coal Co. Shadyside mine, ½ mile east of McGees station, Bell township.
46. Outcrop, 2 miles northeast of Mahaffey, Bell township.

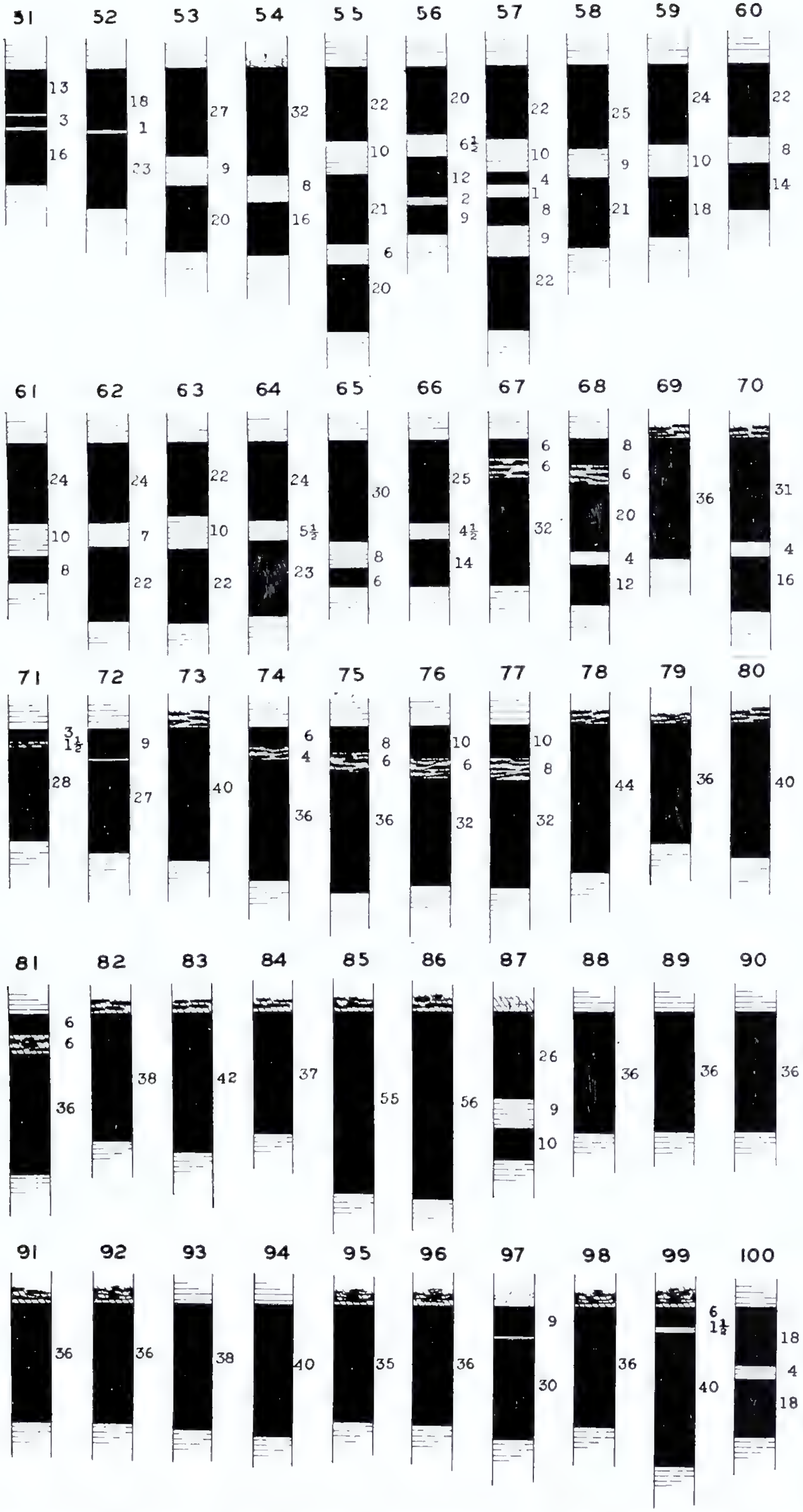


Figure 65. Sections of Lower Kittanning coal in Clearfield County.

47. Outcrop at Mahaffey, Bell township.
48. Outcrop ½ mile south of Mahaffey, Bell township.
49. Outcrop at Bethlehem, Bell township.
50. Outcrop, 1 mile east of Bells Landing, Greenwood township.
51. Overiver Coal Mining Co. Overiver No. 1 mine, 1 mile north of Clearfield, Lawrence township.
52. Five Brothers Coal Co. McCorkle mine, 2 miles east of Clearfield, Lawrence township.
53. Oliver Coal Mining Co. Coal Run No. 2 mine, 1 mile west of Osceola, Decatur township.
54. Frelin Coal Co. Verdun No. 1 mine, 2 miles northwest of Osceola, Decatur township.
55. Brogarsan Coal Mining Co. Brogarsan No. 7 mine, 2 miles northwest of Osceola, Decatur township.
56. Carmac Coal Co. Carmac mine, 3 miles northwest of Osceola, on Big Run, Decatur township.
57. Paragon Coal Mining Co. Burtner No. 3 mine, 3½ miles northwest of Osceola, Decatur township.
58. Inspiration Coal Co. Mary Lou mine, on Coal Run, 1 mile northwest of Coal Run Junction, Decatur township.
59. Ramey Coal Co. Ramey No. 2 mine, 1 mile southeast of Coal Run town, Decatur township.
60. Briar Hill Coal Mining Co. Briar Hill mine, 1 mile north of Coal Run, Decatur township.
61. Elley-Schote Mining Co. Coaldale No. 16 mine, 2½ miles north of Brisbin, town, Decatur township.
62. Grampian Coal Mining Co. Penn No. 8 mine, on Little Beaver Run, 1 mile north of Old Moshannon, Decatur township.
63. Ramey Coal Co. Ramey No. 1 mine, 2 miles northeast of Brisbin, Decatur township.
64. Nevering Coal Co. Little Beaver mine, on Little Beaver Creek, 2 miles northeast of Houtzdale, Decatur township.
65. Coal Run Junction Mining Co. Coal Run Junction mine, at Coal Run Junction, Decatur township.
66. Moshannon Coal Mining Co. Moshannon No. 12 mine, at Old Moshannon, Decatur township.
67. Stott Hartley. Hartley No. 3 mine, at Graham station, Decatur township.
68. Roden Coal Mining Co. Alden No. 3 mine, on Fort Mocks Hill, 2 miles northwest of Philipsburg, Decatur township.
69. Jefferson Ridge Coal Co. Jefferson slope mine, 1½ miles west of Philipsburg, Decatur township.
70. Liberty Coal Mining Co. Baltic shaft, at New Liberty, 1½ miles northeast of Osceola.
71. B. & C. Coal Co. National No. 1 mine, on Laurel Run, 1½ miles northwest of Philipsburg, Decatur township.
72. Meadowbrook Coal Co. Meadowbrook No. 2 mine, ½ mile south of Blue Ball, Decatur township.
73. Maston Coal Co. Maston slope, at Hawk Run, Decatur township.
74. Kristianson & Johnson. Kristianson No. 1 mine, on Emigh Run, near reservoir, 2½ miles north of Philipsburg, Morris township.
75. Morrisdale Coal Co. Morrisdale Shaft No. 1 mine, 1 mile southeast of Morrisdale, Morris township.
76. Victoria Coal Mining Co. Acme No. 7 mine, 1 mile east of Hawk Run, Morris township.
77. Royal Coal Mining Co. Ogle No. 7 slope, at Allport, Morris township.
78. Lane Coal Co., Inc. at Munson, Morris township.
79. Ashman Coal Co. Ghem mine at Munson, Morris township.
80. Peale, Peacock & Kerr, Inc. Ogle No. 1 mine, ¾ mile north of Winburne station, Cooper township.
81. Moravian Coal Co. Knox Run mine at Knox Run, Cooper township.
82. Moravian Coal Co. Moravian No. 1 mine at Grass Flat, Cooper township.
83. Clearfield Bituminous Coal Corp. Cooper No. 2 mine at Grass Flat, Cooper township.
84. Laurel Coal Co., Inc. Sandy Run No. 1 mine at Sandy Run, Graham township.
85. A. B. Lansberry. Lansberry mine, 3 miles north of Woodland, Bradford township.
86. Woodland Cannel Coal Co. Cannel Crest mine, 2 miles north of Woodland, Bradford township.
87. Graham Coal Co. Graham No. 2 mine, 2 miles northeast of Woodland, Bradford township.
88. Patchin Coal Mining Co. Patchin No. 1 mine, 5 miles northeast of Clearfield and 2 miles northeast of Woodland, Bradford township.
89. Penfield Coal & Coke Co. Penfield No. 1 mine at Penfield, Huston township.
90. Moose Run Coal Co. Moose Run mine, 1 mile east of Penfield, Huston township.

91. Tyler Coal Co. Tyler No. 1 mine, at Tyler, Huston township.
92. Tyler Coal Co. Tyler No. 3 mine, near Tyler, Huston township.
93. Cascade Coal & Coke Co. Tyler No. 7 mine at Tyler, Huston township.
94. Goshen Coal Co. Goshen No. 5 mine, near Surveyor, Goshen township.
95. Bald Hill Coal Co. Victor No. 44 mine, 3 miles east of Surveyor.
96. Hetrick Coal Co. Red Top No. 2 mine, 2 miles west of Lecontes Mills, Girard township.
97. Kelley and Shadeck. Pine Run mine, near Karthaus, Karthaus township.
98. Potter-Bigler & Potter, Inc. Mt. Carmel mine near Karthaus, Karthaus township.
99. Harrington Coal Co. Harrington No. 1 mine, 6 miles southwest of Karthaus, Covington township.
100. General Refractories Co. Rubley No. 2 mine, 2 miles northeast of Karthaus, Karthaus township.

*Figures 64 and 65 include a number of sections of coals called locally B but believed to be the A. This is probably true of sections 18, 26, 29-32, 34-37 40 and 45. Many of the mines represented here have been opened since the regions in which they occur have been visited, and future studies may make necessary many other changes.

Middle Kittanning (C) Coal.

Though reaching a workable thickness locally, the C coal is one of the less important coals in the county. It has the advantage of commonly being a solid bed without partings. It will probably average 2 feet 6 inches over considerable areas. There are only a few mines in the county working this bed in 1926.

It is from 18 inches to 2 feet thick in Bell township around McGees. Many small mines are working this bed in Chest township, where it is commonly 2 feet to 2 feet 8 inches thick, and it is solid or containing only a 2-inch parting near the top (sections 5 to 9). In Jordan township the sections show from 18 inches to 3 feet 2 inches of solid coal.

In Beccaria and Bigler townships the coal is about 3 feet thick, and solid at the few openings where it was seen. In Decatur township a number of openings in this coal show from 2 feet 6 inches to 4 feet 5 inches of solid coal. Several of the sections show in addition other benches of coal not mined, and a few sections show one or two partings which may be from 2 to 3 feet thick. Near Burly a coal thought to be this bed, is 4 feet 2 inches. At Blue Ball this bed reaches 4 feet thick, though commonly it is between 2 and 3 feet thick.

Farther north in the vicinity of Clearfield this bed is the most widely mined bed, measuring from 2 feet 6 inches to 3 feet thick, usually with 1 foot of bony coal over the mined bench. This coal may be counted on to measure 2 feet over a considerable area east of Clearfield.

This bed has long been mined at Guion mine west of Philipsburg where the main bench is from 2 feet 10 inches to 3 feet 6 inches thick, a 6- to 10-inch bench 18 to 24 inches above. This bed is reported as nearly 3 feet thick near Luthersburg in Brady township, and 2 feet 6 inches thick in Karthaus township.

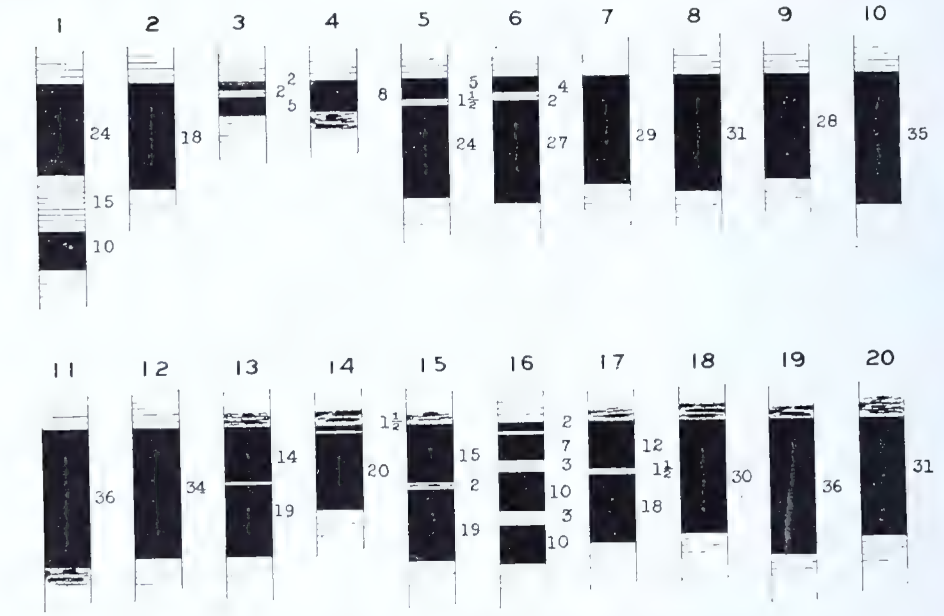


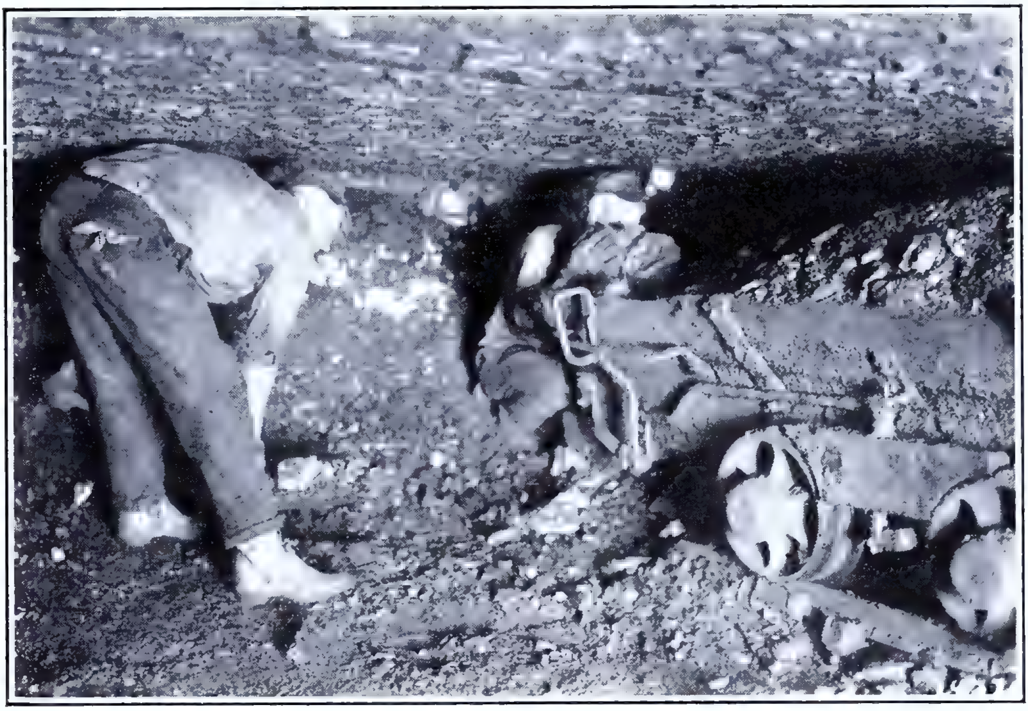
Figure 66. Sections of Middle Kittanning or C coal, Clearfield County.

1. Outcrop 1 mile south of McGees Mills, Bell township.
2. Outcrop ½ mile south of McGees Mills, Bell township.
3. Outcrop in northeast corner of Bell township.
4. Outcrop ½ mile west of Mahaffey, Bell township.
5. Outcrop 4 miles northeast of New Washington, Chest township.
6. Outcrop 4 miles east of New Washington, Chest township.
7. Outcrop 3 miles northwest of Waukesha, Burnside township.
8. Outcrop 2 miles west of Waukesha, Chest township.
9. Outcrop ½ mile north of Welshdale, Chest township.
10. Outcrop 1 mile south of McCartney, Bigler township.
11. Outcrop 1 mile northwest of Glen Hope, Beccaria township.
12. DuBois Mining Co. Luthersburg No. 1 mine, near Luthersburg, and 6½ miles southeast of DuBois.
13. Amos R. Hess. Hillside mine, 1 mile southeast of Clearfield, Lawrence township.
14. Moose Creek Coal Co. Moose Creek mine, 1 mile north of Clearfield, Lawrence township.
15. Penelec Coal Corporation. Penelec No. 2 mine, in Clearfield, Lawrence township.
16. Laurel Run Coal Co. Laurel Run No. 1 mine, near Dimeling, Lawrence township.
17. Eyre Collieries Co. Eagle No. 2 mine, 3 miles south of Clearfield, Lawrence township.
18. United States Refractories Co. Mitchell No. 2 mine, 3 miles southeast of Clearfield, Bradford township.
19. Woolridge Coal Co. Woolridge No. 2 mine, near Woodland, 7 miles southeast of Clearfield, Bradford township.
20. Gonzales Coal Mining Co. Gonzales No. 1 mine, near Karthaus, Karthaus township.

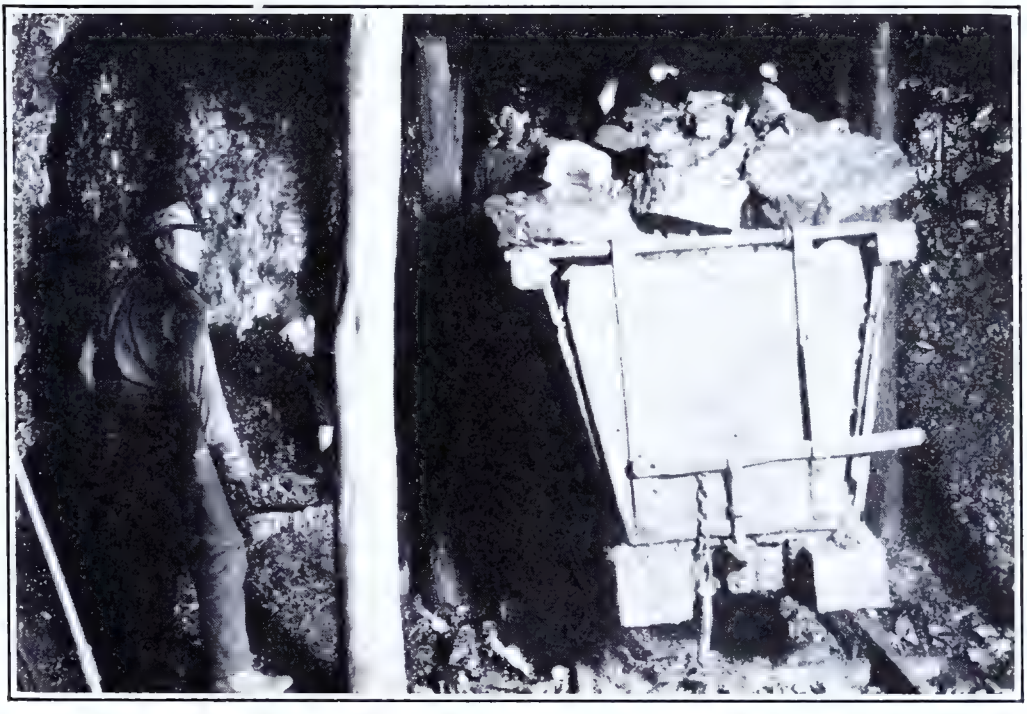
UPPER KITTANNING (C′) COAL.

The Upper Kittanning or C′ coal is the most variable of the seven principal beds in the Allegheny group, locally reaching 4 feet. It is in general less than 2 feet thick, and over most of its area is too thin or too much split up to be of value. As the bed is not being worked in areas where it is thin a compilation of measurements in worked areas may give an impression of extensive workability that

PLATE X.



A. A thin coal bed mined in Clearfield County.



B. A thick coal bed mined in Greene County.

is hardly true. There are many areas in which it is of good workable thickness, but because of its irregularity these can not be taken as indicative of large areas even within the neighborhood of the mines being operated.

A mine near Mahaffey, at which the coal is 3 feet 6 inches thick with two partings, (section 3, Fig. 67) is thought to be in this bed.

In eastern Burnside township and in Chest township this bed has workable thickness at a number of points (sections 1, 2, 10 to 13, and 15). Although in a few places the coal in this region is solid and from 2 to 3 feet thick, at most openings it is much broken up with partings, and the benches separated by these partings vary greatly in thickness. Eastward on the Susquehanna in Greenwood township and in Penn township this bed appears to be thin (sections 4 and 5), but in southern Greenwood township one section shows nearly 3 feet of coal separated into three benches by partings of ½ inch to 2 inches.

In Ferguson township this coal is 2 feet 6 inches thick at one point, but in general is thin, though possibly workable sometime in the future.

In Jordan and Knox townships the coal is generally thin, but at one point in southern Jordan township it reaches a thickness of 3 feet 9 inches.

In Beccaria and Bigler townships a few measurements of this bed indicate that it is either badly split or thin, except at one point in northern Bigler township where it measures 3 feet. Farther east, in Woodward township, the bed has been opened at many points and shows a thickness of 2 to 4 feet, usually solid and therefore of workable value.

In Decatur township likewise the bed if of fair thickness and has been opened at many points, the thickness ranging from 3 feet to 3 feet 6 inches. At most points the bed is solid, which adds greatly to its workability.

It is workable locally in Pike and other townships between Curwensville and DuBois, though commonly split into at least two benches with more or less bone coal on top. In Sandy township, near DuBois, the coal is from 2 feet to 2 feet 8 inches thick.

Little is known of the coal in the eastern or northeastern part of the county, but a section in Karthaus township shows 3 feet 8 inches.

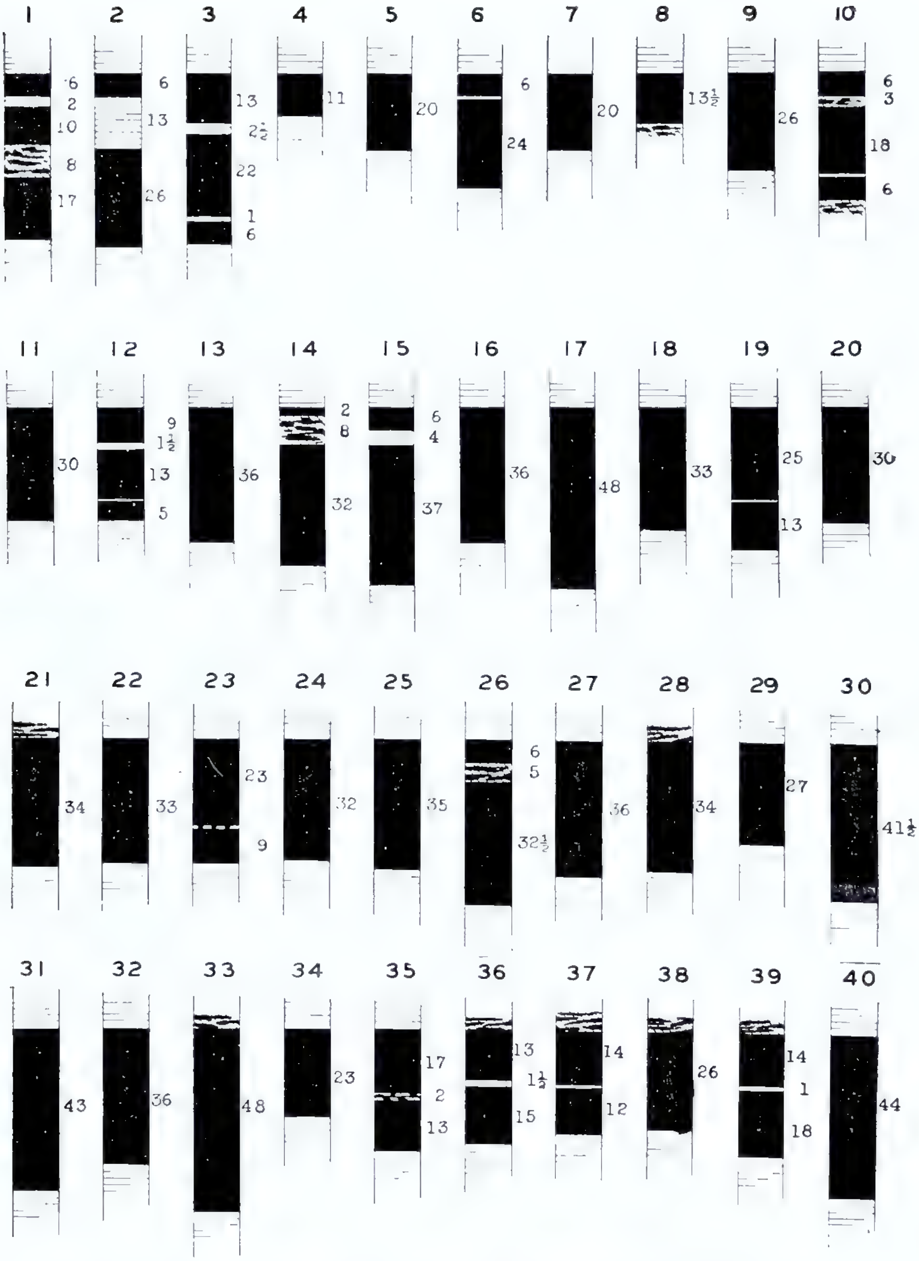


Figure 67. Sections of Upper Kittanning or C′ coal, Clearfield County

1. Outcrop 1½ miles southwest of Welshdale, Chest township.
2. Outcrop 1¼ miles northwest of LaJose, Burnside township.
3. Outcrop ½ mile south of Mahaffey, Bell township.
4. Outcrop on Haslett Run, 3 miles southwest of Bells Landing, Greenwood township.
5. Outcrop 3 miles southeast of Walltown, Penn township.
6. Outcrop 1½ miles northwest of New Millport, Ferguson township.
7. Outcrop 1 mile southwest of Gazzam, Ferguson township.
8. Outcrop 2 miles southeast of New Millport, Knox township.
9. Outcrop 2 miles northeast of Berwindale, Jordan township.
10. Outcrop, 2 miles west of Berwindale, Chest township.
11. Outcrop 1 mile east of Waukesha, Chest township.
12. Outcrop, 1½ miles northeast of Waukesha, Chest township.

13. Priscilla Coal & Coke Co. Priscilla No. 6 mine, ¾ mile north of Garway, Westover township.
14. Pine Ridge Coal Co. Ames No. 1 mine, ⅓ mile north of Ames station, Chest township.
15. Thompson-Lea Coal Mining Co. Elton Colliery No. 1, ½ mile east of Ames station, Chest township.
16. Maryland Coal & Coke Co. Little Soldier mine, 1½ miles north of Amesville, Bigler township.
17. Harford Coal Mining Co. Harford No. 1 mine, 3 miles north of Brisbin, Woodward township.
18. Benson Coal Co. Benson mine, on right bank of Little Beaver Run, 4 miles north of Houtzdale, Woodward township.
19. New Castle Coal Co. New Castle mine, on Little Beaver Creek, 3 miles north of Houtzdale, Woodward township.
20. Dahlin Bros. Coal Mining Co. Dauntless mine, on Moshannon Creek, 2 miles south of Houtzdale, Woodward township.
21. Walter Lobb & Bros. Lobb No. 3 mine, 1½ miles west of Brisbin, on Goss Run, Woodward township.
22. Brogarsan Coal Mining Co. Brogarsan mine, 2 miles west of Osceola, on Coal Run, Decatur township.
23. Geo. A. Myers & Son Coal Co. Arctic mine, 1½ miles southeast of Coal Run town, Decatur township.
24. Bee Hive Coal Co. Bee Hive mine, on Little Beaver Creek, 2 miles north of Houtzdale, Decatur township.
25. Guion Coal Co. Guion mine, near Graham station, Decatur township.
26. Jacob Swites Est. Hartley No. 1 mine, at Graham station, Decatur township.
27. Conquest Coal Mining Co. Conquest No. 1 mine, 2½ miles west of Philipsburg, Decatur township.
28. Maryland Coal & Coke Corp. Imperial No. 4 mine, 1¼ miles northeast of Osceola, Decatur township.
29. White-Dugan Coal Co. Columbia No. 3 mine, ¼ mile northeast of Osceola, Decatur township.
30. General Refractories Co. On Albert Run, 2,000 feet south of Boggs township line, Decatur township.
31. Lakeside Coal Co. Lakeside Colliery, ⅓ mile west of Berwindale, Jordan township. (D coal)
32. Berwindale Coal Co. Berwindale No. 1 mine, ¾ mile south of Berwindale station, Jordan township. (D coal)
33. Jacobs & Delaney Coal Co. Jacobs No. 1 mine, at McGees station, Bell township. (A coal)
34. Crescent Refractories Co. Holden No. 3 mine, 1 mile northeast of Curwensville, Pike township.
35. R. H. Lucas Coal Co. Lucas No. 1 mine, 1½ miles northwest of Luthersburg, Brady township.
36. DuBois Mining Co. Luthersburg No. 2 mine, on B. R. & P. R. R. 6½ miles southeast of DuBois, Brady township.
37. Salem Coal & Coke Co. Luthersburg No. 2 mine, on B. R. & P. R. R. 7 miles southeast of DuBois, Brady township.
38. Wm. Harriger. Falls Creek mine, at Falls Creek, Sandy township.
39. Hopkins Coal Co. Sandy Lick mine, 2 miles north of DuBois, Sandy township.
40. Gonzales Coal Mining Co. Gonzales No. 2 mine at the confluence of Mosquito Creek with the West Branch of the Susquehanna, Karthaus township.

LOWER FREEPORT OR D COAL.

The D bed though less regular than some of the other beds, notably the Upper Freeport and the Lower Kittanning, has been and possibly is yet the most valuable bed in the county. Locally it has a thickness of 9 feet and in large areas has shown a uniform thickness of 4½ to 5 feet. A large quantity of the best coal in this bed has been mined out, and even pillars and other areas left in the first mining have been removed by close second mining. In part of the county this bed splits up into two benches and it is reported that these benches become as much as 55 feet apart at one point. The coal usually has at least one parting in it, though as a rule this parting is thin, commonly not over two inches and in many places not over one inch. The roof is commonly shale though in places bony coal. Below the coal is clay with the Lower Freeport limestone showing locally.

The D coal has been worked around Burnside and west of LaJose and on a small scale at a few other points in Burnside township. Around Burnside the coal ranges from 2 feet 4 inches to 4 feet 6 inches, the best bench ranging from 18 inches to 3 feet 6 inches in thickness, usually with benches above and below separated from the main bench by clay, sandstone, or bone. At several places there are bony benches above and below the main bench of coal. West of LaJose the coal is in two benches, the upper about 28 inches thick, the lower from 7 to 10 inches thick with a 1-inch parting between.

The D coal has been worked around the headwaters of Clover Run in Bell township where it is about 28 or 30 inches thick. Also farther north the same thickness holds. In Brady township the coal is 5 to 6 feet thick with a bony bench for a roof. In one mine the coal is solid, in another it has a 1-inch bony layer 8 inches from the bottom (sections 9 and 10). In Sandy township in the northwest corner of the county the coal again is very thick, ranging from 3½ to 6½ feet in thickness, usually with a 1 or 2 inch parting from 7 to 14 inches from the base and a 1 to 2 inch parting from 5 to 8 inches from the base.

In Greenwood, Penn, and Pike townships the D coal has been opened at many places and is remarkably uniform in thickness and structure. The coal is solid except for a parting of from 1 to 2 inches which is uniformly from 2 to 5 inches from the bottom. The coal occurs high in the hills and therefore does not underlie as large an area in this region as the lower beds. A number of commercial mines work the bed in this area. In a small section west of Grampian the bed thickens up to about 5 feet, loses its parting near the bottom and acquires two partings near the top. The area of such thick coal appears to be quite limited.

The bed appears to be workable within its outcrop under all of Knox and Jordan townships and most of Ferguson township. It averages a little over 3 feet in thickness with usually one parting which does not come at the same position in different mines. The coal reaches 4 feet locally but is thin in parts of the area. In the Gazzam mine the coal is of very high quality but very thin. Some years ago it was being worked at a thickness of 17 inches at the head of rooms before mining was abandoned.

It has been extensively worked at Gazzam, Ansonville, Berwindale, Carnwath, Olanta, and Bloomington, and near Curwensville. Between Olanta and Bloomington the coal is 4 feet.

In Chest township the coal has been opened at many points and has a thickness of 3 feet near Waukesha, near Westover, of 2½ feet. At both of these points it is without partings but in general it is not workable in this township except as quoted and along the eastern edge of the township. In Beccaria township the D coal is believed to be generally workable within its outcrop. In this township, however, it is split over much of its area so that many of the mines are working only the lower bench which runs about 2½ feet thick. Near McCartney both splits have been opened but mining has been principally upon the upper bench. At many places where the bed appears to be thin it is uncertain whether the whole bed is seen or only one split. It is probable that this bed will yield from 2½ to 3 feet of coal under most of the township. In Gulich township the bed is about 3 feet thick and usually without partings. Bigler township has many mines on the lower bench of the bed where the coal is from 2 feet 4 inches to 3 feet thick. In the eastern part of the township the two benches come together and form a solid bed in which, however, it is usually possible to distinguish a parting of cannel coal in the middle. In northern Bigler township the coal shows partings ranging from 4 to 7 inches in thickness. One measurement by the writer northeast of Madera showed 9 feet 11 inches of coal.

From this area northeastward through Woodward, Decatur, and Morris townships lies the original Moshannon coal basin where the bed is from 4 feet to 6 feet 6 inches of solid coal of very high grade. The coal in this basin is about all mined out. The coal lies at an irregular distance above Beaver Run and its tributaries but rises to the northwest and outcrops in the hilltops on the flank of Laurel Hill anticline. The position of the coal here is greatly disturbed by faulting so that two mines on the same bed only a few rods apart may have a difference of elevation of 90 feet.

In Lawrence, Goshen and Bradford townships the coal in this bed closely resembles the bed in Penn township, being in two benches, the upper 23 to 28 inches thick and the Lower 6 to 9 inches thick with a 1 to 2 inch parting. The coal is high in the hills and therefore does not underlie large areas.

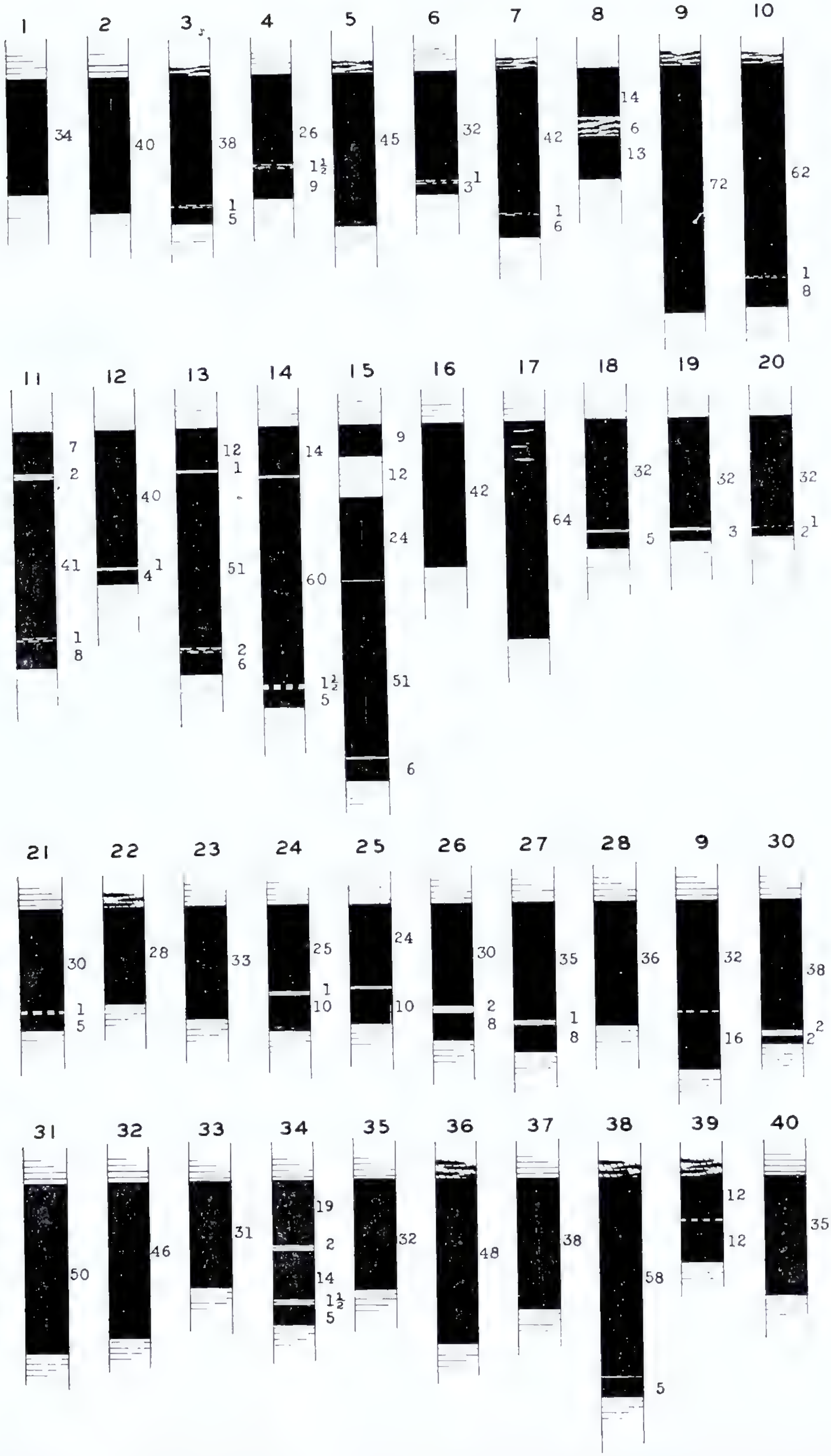


Figure 68. Sections of the Lower Freeport or D coal in Clearfield County

1. Roberta Coal Co. Roberta No. 1 mine, 1 mile south of La Jose, Burnside township.
2. Glenwood Coal Co. Glenwood No. 14 mine, at Burnside, Burnside township.
3. Patchin Coal Mining Co. Patchin No. 2 mine, at Burnside, Burnside township.
4. Lost Run Coal Mining Co. Lost Run mine, 5 miles north of Hillman, Bell township.
5. Beccaria Coal Co. Standard No. 1 mine, ½ mile west of McGees Mills, Bell township.
6. Mount Airie Coal Co. Mount Airie No. 1 mine, 2 miles southwest of McGees Mills, Bell township.
7. Cushake Coal Mining Co. Cushake mine, at Cush Creek Junction, Bell township.
8. Mahaffey Coal Mining Co. Mahaffey mine, 1 mile east of Mahaffey, Bell township.
9. Northwestern Mining & Exchange Co. Eriton shaft, 2 miles north of Troutville, Brady township.
10. Rochester & Pittsburgh Coal & Iron Co. Helvetia-Stanley mine, 1 mile north of Troutville, Brady township.
11. Hopkins Coal Co. Hopkins No. 2 mine, near DuBois, Sandy township.
12. George Minns, Jr. Clear Run mine, 1 mile north of DuBois, Sandy township.
13. Buffalo & Susquehanna Coal & Coke Co. DuBois Shaft No. 1, 1¼ miles southeast of DuBois, Sandy township.
14. Buffalo & Susquehanna Coal & Coke Co. DuBois Shaft No. 2, 2½ miles south of DuBois, Sandy township.
15. Brown & Berty Coal Co. Brown & Berty mine, 2½ miles west of DuBois, Sandy township.
16. Outcrop, 5 miles northeast of Rowles, Penn township.
17. Belfast Coal Co. Belfast No. 1 mine, at Grampian, Penn township.
18. Ellery Coal Mining Co. Coaldale No. 15 mine near Lumber City, Penn township.
19. Charles Bowers Coal Co. Bowers No. 1 mine at Lumber City, Penn township.
20. Good Clay & Coal Co. No. 22-A mine, near Bells Landing, Greenwood township.
21. Outcrop 2 miles northeast of Bells Landing, Greenwood township.
22. Good Clay & Coal Co. Good No. 23 mine at New Millport, Ferguson township.
23. Outcrop 2 miles northeast of Marion, Ferguson township.
24. Peale, Peacock & Kerr, Inc. No. 19-A mine, 1½ miles south of Curwensville, Pike township.
25. Denro Coal Mining Co. Alden No. 2 mine, 2 miles south of Curwensville, Pike township.
26. Kelly D. Bloom. Bloom mine, 1½ miles northeast of Curwensville, Pike township.
27. Outcrop ¼ mile north of Curwensville, Pike township.
28. Carnwath Coal Co. Carnwath No. 2 mine, at Carnwath, Knox township.
29. Outcrop, at Olanta, Knox township.
30. Outcrop, 1 mile southeast of New Millport, Knox township.
31. Outcrop at Erhard, Knox township.
32. W. A. Gould & Brother. Midvale No. 4 mine, ¾ mile northeast of McCartney, Jordan township.
33. Quinn-Simler Coal Co. McCartney No. 1 mine, at McCartney station, Jordan township.
34. Lamborn Coal Co. Witherow No. 2 mine, 1¼ miles west of McCartney, Jordan township.
35. Outcrop at Gazzam, Jordan township.
36. Outcrop at Ansonville, Jordan township.
37. Outcrop at Berwindale, Jordan township.
38. Outcrop 1 mile southwest of McCartney, Jordan township.
39. Outcrop on Porter Run, 2 miles southwest of McCartney, Jordan township.
40. Outcrop 1½ miles northeast of Glen Hope, Beccaria township.
41. Victor Collieries Co. Black Elk mine, 1½ miles northwest of Irvona, Chest township.
42. Outcrop 1½ miles southwest of Welshdale, Chest township.
43. Outcrop 1 mile west of Westover, Westover Boro.
44. Outcrop at Westover, Westover Boro.
45. Outcrop on Pine Run, 2 miles northeast of Westover, Chest township.
46. Glen Hope Coal Mining Co. Glen Hope No. 1 mine, ½ mile southwest of Glen Hope, Beccaria township.
47. Blue Run Coal Co. Blue Run No. 1 mine, ¾ mile north of Glen Hope, Beccaria township.
48. Wendell Coal Mining Co. Chesterfield No. 1 mine, 2¾ miles southwest of Banian Junction, Beccaria township.
49. W. R. Gallagher Coal Co. Black Oak No. 3 mine, 1 mile southwest of Smoke Run station, Beccaria township.
50. Moshannon Smithing Coal Co. Glenmar No. 1 mine, ⅓ mile south of Beccaria town, Beccaria township.

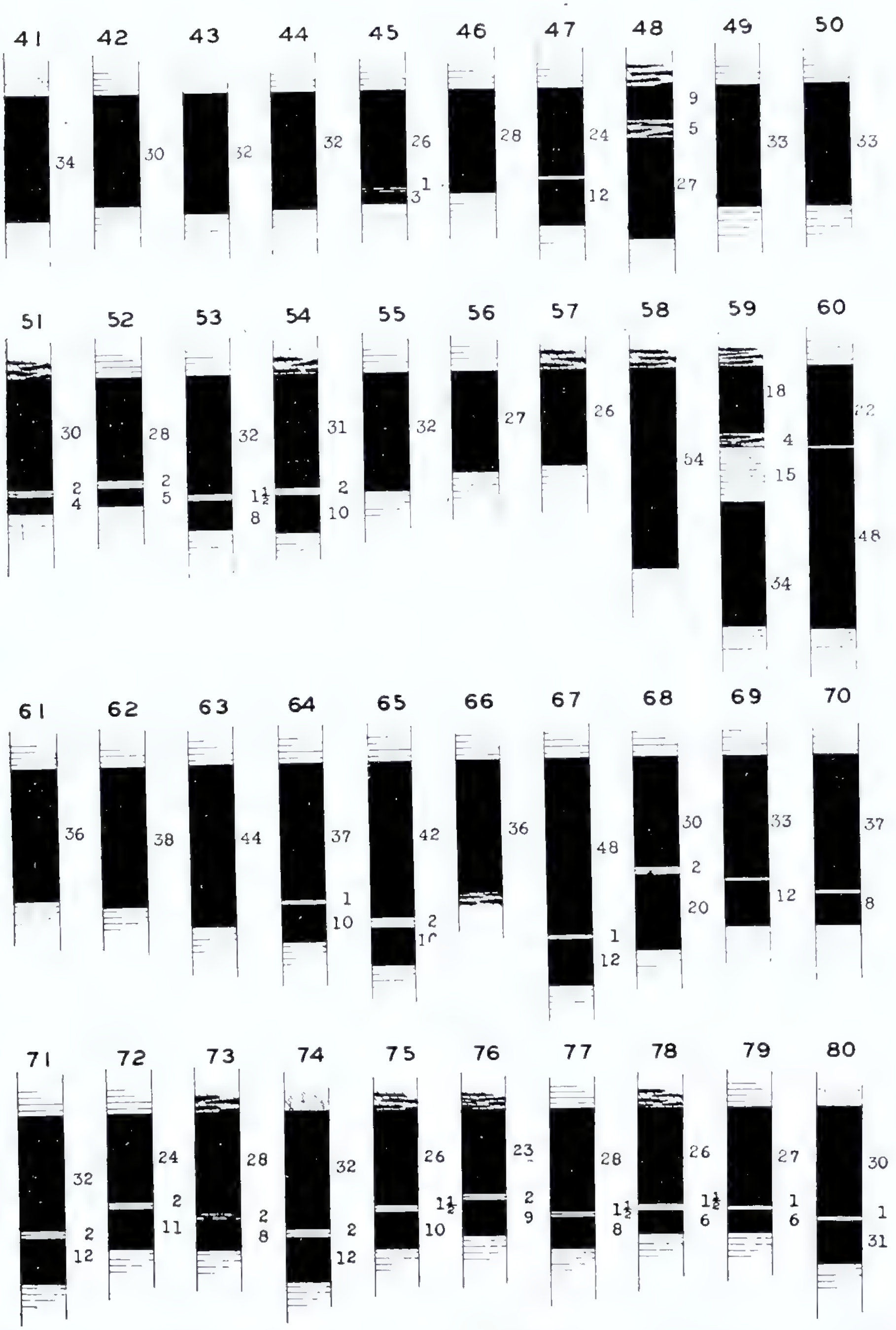


Figure 69. Sections of the Lower Freeport or D coal in Clearfield County

51. Leland Coal Co. Leland No. 10 mine, ½ mile south of Beccaria, Beccaria township.
52. Liberty Coal Mining Co. Cammos No. 4 mine, at Heverly station, Beccaria township.
53. Liberty Coal Mining Co. Cammos No. 2 mine, 2 miles east of Coalport station, Beccaria township.
54. S. Hagerty's Sons. Oakland No. 4 mine, 1 mile southeast of Coalport, Beccaria township.
55. Standard Moshannon Coal Co. Standard No. 4 mine, 1½ miles south of Muddy Run station, Gulich township.
56. Burtner Coal Mining Co. Burtner No. 4 mine, 1½ miles southwest of Smoke Run, Gulich township.
57. Patchin Coal Mining Co. Falcon No. 3 mine at Beccaria, Gulich township.

58. Henrietta Coal Co. Henrietta No. 5 mine, 1 mile southwest of Morann, Gulich township.
59. Bulah Shaft Coal Co. Bulah Shaft mine, in boro of Ramey.
60. Alexander Coal Co. Alexander mine, at Madera station, Bigler township.
61. Nugent Coal Co. Nugent No. 1 mine, 1½ miles northeast of McCartney, Bigler township.
62. Claire Coal Co. Webster No. 4 mine, 1½ miles northwest of Ramey, Bigler township.
63. Dahlin Bros. Coal Mining Co. Stanley No. 2 mine, 2 miles southwest of Houtzdale, Woodward township.
64. Butterworth Brothers. Keystone Drifts, at New Liberty, Decatur township.
65. H. B. Scott. Colorado mine, 1 mile north of Philipsburg, Decatur township.
66. Conquest Mining Co. Imperial No. 1 mine, 1 mile north of Drane, Decatur township.
67. Jas. F. Dugan & Co. Beacon No. 1 mine, 3 miles north of Osceola, Decatur township.
68. H. B. Scott. Colorado No. 4 mine, at Munson, Morris township.
69. Lane Coal Co. Lane No. 5 mine, at Allport, Morris township.
70. Morrisdale Coal Co. Morrisdale No. 9 mine, at Morrisdale, Morris township.
71. W. E. Harris Coal Co. Lane No. 1 mine, 1 mile north of Philipsburg, Morris township.
72. Harry Barnes & Co. Tin Top mine, 1 mile northwest of Munsons, Morris township.
73. Reading & Clearfield Coal Co. Bear Hill mine, on Susquehanna River east of Clearfield, Bradford township.
74. United States Refractories Co. Mitchell No. 1 mine, 3 miles southeast of Clearfield, Bradford township.
75. Eyre Collieries Co. Eagle No. 3 mine, 3 miles west of Clearfield, Lawrence township.
76. Peale, Peacock & Kerr. No. 5A 1 mine, 4 miles northeast of Curwensville, Lawrence ownship.
77. Peale, Peacock & Kerr. No. 5A 2 mine, at Glen Richey, Lawrence township.
78. Wiley Coal Co. Wiley No. 1 mine, 2 miles west of Clearfield, Lawrence township.
79. Goshen Coal Co. Goshen No. 2 mine, at Surveyor, Goshen township.
80. Taylor Coal Co. Taylor No. 2 mine, at Surveyor, Goshen township.

UPPER FREEPORT OR E COAL.

In general the E coal is a fairly thin but persistent bed in this county. Its thickness is commonly less than 3 feet and most sections show less than 2 feet 6 inches. It is commonly without partings though partings appear in most areas where the bed is above normal thickness. Locally the bed thickens to 5 feet or more. In the Moshannon basin this bed is called the "cap seam." It had long been supposed that the mining out of the thick Moshannon bed under it would render this bed entirely unminable. Attempts to mine the coal, however, have shown that some, if not all, of the bed can be recovered, though it is rather badly crushed by the irregular settling of the rocks between it and the D bed.

Prospecting indicates that the bed is thin in the southwest corner of the county and this condition is believed to hold over most of Burnside township. Around Burnside the bed is fairly thick and is extensively mined to the westward in Indiana County. In Bell township the bed lies high in the hills. It has been mined on the head of Clearfield Run but is thin in the southern part of the township, averaging about 2½ feet or less. It thickens farther north but is commonly broken with many thin partings. In Sandy township it is about 2 feet thick where known.

In the townships north of Susquehanna River, Greenwood, Penn, and Pike, it is persistent but thin. Though locally reaching 3 feet or even 3 feet 6 inches most measurements show but little over 2 feet of coal. South of the river in Susquehanna township the coal is about 2½ feet thick but appears to be thin in most of Ferguson township though it is more than 2 feet thick in the northern part of that township.

In Knox and Jordan townships the E coal becomes of good thickness over limited areas, reaching nearly 4 feet south of New Millport and 5 feet west and north of Erhard.

In Beccaria township the E bed is about 2½ feet thick, reaching 4 feet at one point near Glen Hope. In the eastern part of the township it keeps under 2½ feet and this is true of the bed in Gulich township adjoining on the east. Farther northeast the thickness increases in Woodward and Decatur townships, averaging around 3 feet, commonly without partings. In southern Lawrence township the thickness averages about 2½ feet. In Morris township the bed is from 2 to 3 feet thick. In Goshen and Girard townships the thickness is more, there usually being one bench nearly or quite 3 feet thick and underlain by a parting from 1 to 3 inches and a lower bench from 4 to 10 inches thick.

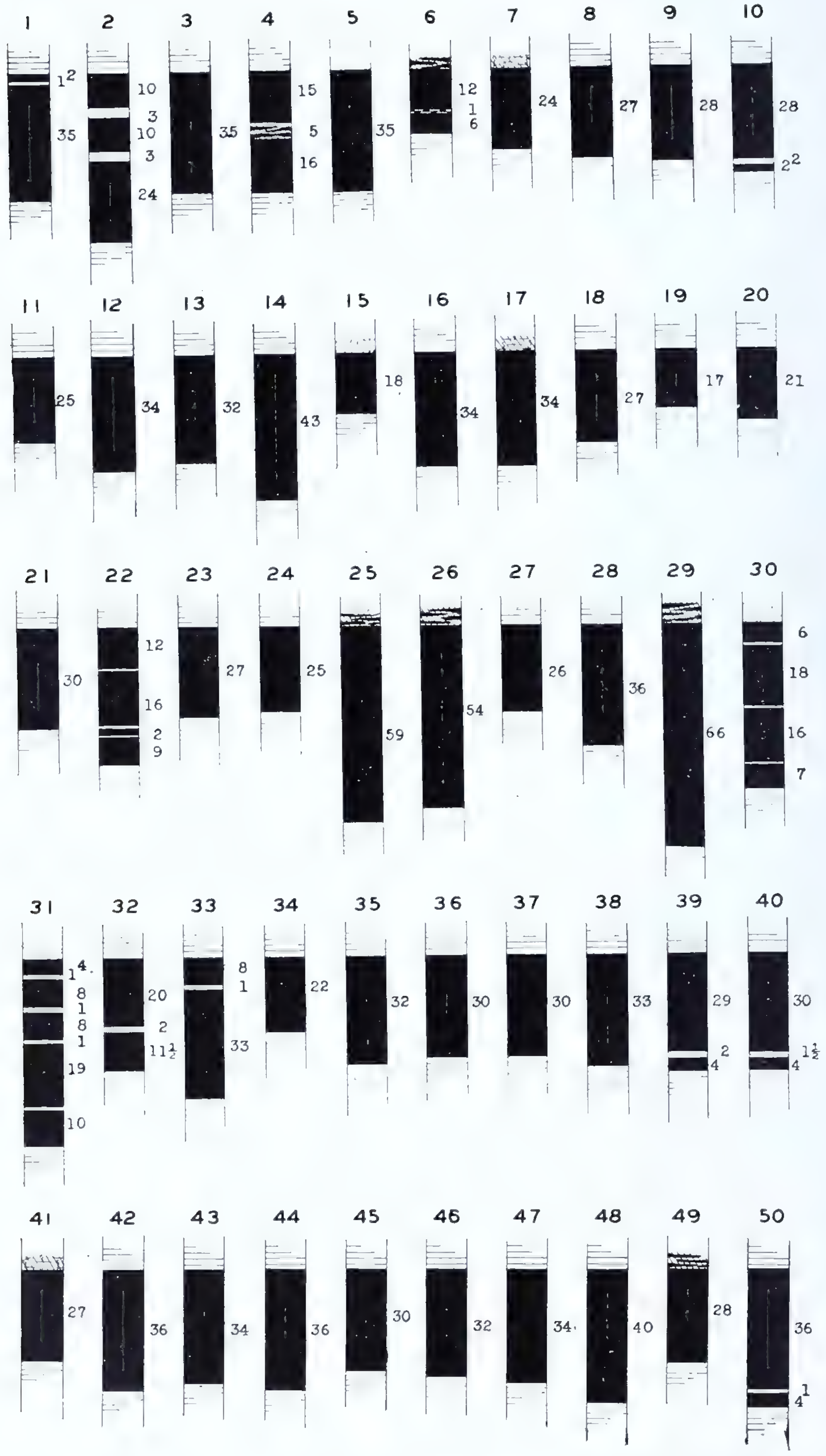


Figure 70. Sections of Upper Freeport coal in Clearfield County.

1. Outcrop at Burnside, Burnside township.
2. Outcrop 1 mile north of Burnside, Burnside township.
3. Outcrop 1 mile south of Mahaffey, Bell township.
4. Woodland Coal Mining Co. Howard No. 1 mine, ½ mile east of Mahaffey, Bell township.
5. Madeira-Hill Co. Clover Run No. 1 mine. On head of Clover Run, 1½ miles northwest of Newtonburg.
6. M. & N. Coal Co. M. & N. No. 1 mine, ½ mile east of Mahaffey, Bell township.
7. John E. DuBois Coal Mines. Deer Park mine, 3 miles north of DuBois, Sandy township.
8. Crescent Refractories Co. Rowles Station No. 2 mine, 1 mile south of Curwensville, Pike township.
9. Outcrop 1 mile southeast of Curwensville, Pike township.
10. Outcrop 1½ miles northeast of New Millport, Pike township.
11. Outcrop, 4 miles west-southwest of Curwensville, Pike township.
12. Outcrop 3 miles north of Walltown, Bloom township.
13. Outcrop in northeast corner of Bell township.
14. Outcrop 3 miles north of Rowles, Bell township.
15. Outcrop in northern Penn township, 5 miles northwest of Welltown.
16. Bell Run Coal Co., Inc. Bell Run No. 1 mine, at Grampian, Penn township.
17. Burns Brothers. Penn No. 3 mine, at Grampian, Penn township.
18. Outcrop on Bell Creek, 3 miles south of Walltown, Penn township.
19. Outcrop 2 miles north of Bells Landing, Greenwood township.
20. Outcrop 2½ miles northwest of Bells Landing, Greenwood township.
21. Outcrop 1¼ miles west of Bells Landing, Greenwood township.
22. Outcrop 3 miles southwest of Bells Landing on Haslett Run, Greenwood township.
23. Outcrop 2½ miles southwest of Bells Landing, Greenwood township.
24. Outcrop 2 miles east of New Millport, Knox township.
25. Outcrop 1½ miles northeast of Erhard, Knox township.
26. Outcrop, 1¼ miles southwest of New Millsboro, Knox township.
27. Outcrop in north corner of Jordan township.
28. Outcrop 2 miles east of Ansonville Jordan township.
29. W. A. Gould & Brother. Midvale No. 4 mine, ¾ mile northeast of McCartney, Jordan township.
30. Quinn-Simler Coal Co. McCartney No. 3 mine, at McCartney station, Jordan township.
31. Lamborn Coal Co. Witherow No. 1 mine, 1 mile west of McCartney, Jordan township.
32. Outcrop 2 miles southeast of LaJose, Chest township.
33. Outcrop, 1¼ miles north-northeast of Westover, Chest township.
34. Outcrop, 1 mile northeast of Westover, Chest township.
35. Outcrop 2 miles southeast of Westover, Chest township.
36. Outcrop, ¼ mile north of Glen Hope, Beccaria township.
37. Outcrop on Clearfield Creek 4 miles east of Irvona, Beccaria township.
38. Boron and Richards Coal Co. Mt. Vernon No. 11 mine, at end of P. & S. V. R. R., 3 miles west of Ramey, Gulich township.
39. S. J. Mountz & Co. Waverly mine, ¾ mile north of Smith Mills, Gulich township.
40. S. J. Mountz & Co. Viola No. 3 mine, ½ mile south of Smith Mills, Gulien township.
41. Liberty Coal Mining Co. Cammos No. 5 mine, ¾ mile south of Smith Mills, Gulich township.
42. M. & F. Craig. Sterling No. 2 mine, on Goss Run near Brisbin, Woodward township.
43. Bessemer Coal Co. Bessemer mine, 1 mile north of Brisbin, Woodward township.
44. Walter Lobb & Bros. Lobb No. 2 mine, 1¾ miles west of Brisbin, Woodward township.

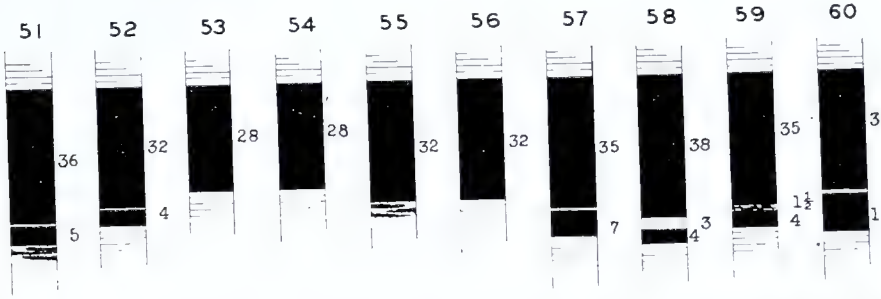


Figure 71. Sections of Upper Freeport coal in Clearfield County.

45. Alex McKenzie Sons. McKenzie mine, ⅜ mile southwest of Houtzdale, Woodward township.
46. Atlantic Coal Mining Co. Atlantic No. 2 mine, at West Moshannon, Woodward township.
47. Guernsey Coal Co. Henrietta No. 2 mine, 4 miles northwest of Houtzdale, Woodward township.
48. Rockyledge Coal Co. Rockyledge No. 1 mine, 3½ miles north of Osceola, Decatur township.
49. Caldwell Smokeless Coal Co. Caldwell No. 3 mine, 3 miles north of Philipsburg, Decatur township.
50. South Coal Manufacturing Co. Laura mine, 1 mile southwest of Gearhartville, Decatur township.
51. Hartley-Spackman Coal Co. Centre No. 1 mine, 1 mile west of Gearhartville,
52. H. M. Hughes. Redding No. 3 mine, at New Liberty, Decatur township.
Decatur township.
53. Smith & Hohnke. Phoenix No. 1 mine, 1 mile north of Hawk Run, Morris township.
54. Hill Brothers. Ashman No. 4 mine, ½ mile north of Hawk Run, Morris township.
55. Decatur Coal Co. Decatur No. 3 mine, at Hawk Run, Morris township.
56. Decatur Coal Co. Decatur No. 9 mine at Nuttals, Morris township.
57. Goshen Coal Co. Goshen No. 1 mine at Surveyor, Goshen township.
58. Outcrop, at Surveyor station, Goshen township.
59. Harbison-Walker Refractories Co. Croft mine, near Surveyor, Goshen township.
60. Bald Hill Coal Co. Victor No. 41 mine, near LeContes Mills, Girard township.

CHAPTER XI.

CLINTON COUNTY

INTRODUCTION

The lower part of the Allegheny group and the Pottsville series are the only coal-bearing rocks in Clinton County. These rocks are confined to three basins which cross the county in a general northeast-southwest direction. The coal areas are small, and confined to the highest points in these basins.

The Tangascootack basin is bounded on the south and east by Allegheny Mountain, and on the west by Furney anticline. The Wetham basin, lying northwest of Furney anticline, is small, and contains but few isolated areas of coal. The Renovo-Karthaus basin has preserved several small areas of coal in the hills north of Susquehanna River in East and West Keating townships, Leidy, Noyes, and Chapman townships.

The coal mining districts of Clinton County are served by the Pennsylvania and New York Central railroads.

COALS.

POTTSVILLE COALS.

The Pottsville series contains four coal beds. The lowest one is known locally as the Marshburg coal, and is probably the Sharon of Mercer County. It is thin and unimportant in Clinton County, having a maximum thickness of 2 feet, and averaging less than 12 inches.

The three coals of the Alton group lie below the Johnson Run sandstone, the top of the Pottsville, and are probably the equivalent of the Mercer coals of Mercer County. The Lower Alton coal, lying about 35 feet above the Marshburg coal, is generally divided into three benches, 1 foot 9 inches, 9 and 3 inches thick, separated by shale partings, usually about 3 inches thick. The upper bench has good quality, but the two lower benches are high in ash and sulphur. The Middle Alton coal is thin, having a maximum thickness of 12 inches, and averaging less than 6 inches. The Upper Alton coal ranges from 4 to 5 feet thick, with a characteristic shale parting 12 inches thick, about 2 feet below the top. The top bench is excellent coal, but the lower one is full of knife blades of pyrite and bone.

ALLEGHENY COALS.

The coals of the Allegheny group in Clinton County have not been definitely correlated. The coal geologically lowest is probably the Brookville. The bed is mined in Bald Eagle township, where it ranges from 3 to 5 feet thick, its only distinct impurity being a thin bone parting near the top. The coal is rather high in sulphur. North of Susquehanna River in the Tangascootack basin, it averages 3 feet thick and has fair quality. This bed ranges from 2 to 4 feet thick in the Renovo basin, and is generally split near the middle by a 1-inch bone parting. The coal is high in sulphur.

A coal lying about 70 feet above the one tentatively correlated as the Brookville, is probably the Lower Kittanning. This bed ranges from 4 inches to 4 feet thick in the Tangascootack, basin, and is extremely irregular. Roof rolls make mining uncertain. A coal which is probably the same bed, is extensively mined at Bitumen, where it ranges from 3 feet 6 inches to 5 feet 2 inches thick, averaging 4 feet 4 inches thick. The coal is very high in sulphur, but carries only one thin bone parting, usually near the middle of the bed. This coal averages 20 per cent volatile matter, 67 per cent fixed carbon, 8.6 per cent ash, and 3 per cent sulphur.

The topmost coal of the Allegheny group is contained in the tops of a few high hills, and lies about 110 feet above the coal last described. It is generally about 4 feet 6 inches thick, separated into two benches by a bone parting 4 inches thick near the middle. This bed is being stripped on Susquehanna River in West Keating township. It occurs in two benches separated by 6 feet of fire clay. Only the top bench, which is 2 feet 8 inches thick, is being loaded. The bench underneath the thick clay parting is usually 2 feet 2 inches thick.

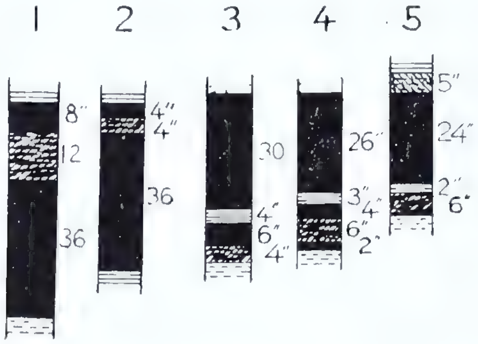


Figure 72. Sections of Brookville coal in Clinton County.

1. Scootac Mining Company. Scootac No. 3 mine, at Tanga, on Scootac Creek R. R., Bald Eagle township.
2. Stowe-Fuller Refractories Company. Birge Run mine, at Birge Run, Bald Eagle township.
3. Harry J. Batschelet. Batschelet mine, 2 miles west of Renovo, on left bank of Drury Run, Noyes township.
4. Elk Fire Brick Company. Reno mine, 2½ miles west of Renovo, on left bank of Drury Run, Noyes township.
5. Queens Run Refractories Company. West Branch Nos. 1 and 2 mines, 2½ miles west of Renovo on right bank of Drury Run, Noyes township.

CHAPTER XII.

ELK COUNTY

INTRODUCTION

Elk County is the largest producer of bituminous coal in northern Pennsylvania. It contains ten minable coal beds. The Lower Kittanning (Dagus) coal is the most important, and the Clermont (Clarion or Brookville) ranks second. The remainder are locally of value, but are seldom mined for shipping coal.

Elk County is well served by railroads. The Pennsylvania Railroad crosses the county from north to south and east to west, and follows Bennetts Branch across the southeast corner. The Buffalo and Susquehanna also follows Bennetts Branch across this corner of the county. The Pittsburgh, Shawmut, and Northern Railroad crosses the eastern part of the county from north to south, has a few miles of track between Irwintown and Croyland, also branches, and trackage rights on parts of the Erie railroad. The Buffalo, Rochester, and Pittsburgh Railroad from Clarion Junction to the southwest boundary and the Erie Railroad from Clarion Junction to the northern boundary make a continuous line across the county and use each other's tracks. The Erie Railroad also has a few miles of track on Little Toby Creek in the south central part of the county.

STRUCTURE.

The coal-bearing rocks of Elk County lie nearly flat, capping the plateau along the axis of four minor synclines. The first of these structural basins follows Bennetts Branch of the Susquehanna near Caledonia and Benezette; the second passes through Shawmut and Brockport and extends along Little Toby and Elk creeks; the third lies near Lake City, Ridgway, and St. Moran and continues northeast; the fourth follows the same general direction through Spring Creek, Summit, and Highland. A considerable area of coal is preserved in these shallow basins, particularly the coals in the lower Allegheny group and Pottsville series.

STRATIGRAPHY.

The outcropping consolidated rocks of Elk County are the Allegheny group, Pottsville, and Mauch Chunk series of Carboniferous age, and the Pocono and Catskill series of Devonian age.

The Allegheny group is composed of massive sandstones, shales, limestones, clays, and several coal beds.

The Pottsville series is composed of massive sandstones, a few shales, and three unimportant coal beds.

The Mauch Chunk, Pocono, and Catskill series are composed of sandstone and shale, and are not coal-bearing.

COALS.

POTTSVILLE COALS.

Three coal beds in the Pottsville series, approximately at the horizon of the Mercer coals, are known locally as the Alton coals. Although these beds are generally thin, and high in ash and sulphur, in some places they are thick enough to be mined.

One of these beds is locally 3 feet thick on Canal Run, but is high in sulphur and ash. On Sterling Run and its branches the Alton coals have been opened; the upper one is reported 3 feet 8 inches thick and very high in sulphur; the middle coal is 18 inches thick; and the lower, 3 feet.

At St. Marys the upper coal is 2 feet 7 inches thick, and the lower one 3 feet thick. They are full of bone and pyrite. These coals were once opened northwest of St. Marys. They average less than 2 feet thick, and are dirty.

The Alton coals have been opened on Spring Run, north of Benezette, where the upper coal is about 2 feet 9 inches thick. On Antens Run both the upper and lower Alton coals range from 2 to 4 feet thick. Their quality is very poor.

In Jay township the middle Alton coal is locally 3 feet 10 inches thick, and is good clean coal. It has been mined on Spring Run and near Weedville.

In Fox township the upper Alton coal is divided into three benches, 14 inches, 18 inches, and 1 foot 8 inches thick, by partings about 3 inches thick. The lower coal is separated into two benches, 1 foot 8 inches and 15 inches thick, by a shale parting 2 to 3 inches thick. The upper bench is the better coal. Along Laurel Run the upper coal is 2 feet 6 inches thick, and the lower one 3 feet thick.

In Jones, Ridgway, and Spring Creek townships the upper Alton coal is locally 3 feet thick and the lower, 3 feet 6 inches thick.

In the vicinity of Montmorency these coals are from 3 to 4 feet thick, and are parted by numerous bands of bone coal. In Spring Creek township the upper Alton coal is locally 4 feet 5 inches thick, and is parted into two benches by 4 inches of shale, 8 inches above the bottom. On top of these benches is a bony bench 18 inches thick. The lower Alton coal has good quality and is 2 feet thick. It is capped by 2 feet of shale and bony coal.

These coals are extremely high in ash and sulphur, and at present are worked only for local fuel. It is doubtful if they will ever be important as shipping coals.

CLERMONT COAL.

A coal lying directly above the Pottsville sandstone or separated from it by a few feet of shale, was correlated as the Clarion coal by the Second Geological Survey. There is reason to believe that this bed may be the Brookville coal, and until further detailed work is done in this region, its correlation will be uncertain.

This bed, lying about 80 feet below the Lower Kittanning and locally 5 feet 6 inches thick, is one of the important coals in the county. Its quality is variable but generally the coal is rather high in ash and sulphur.

In Benezette, Fox, and Jay townships the Clermont coal ranges from 2 feet to 5 feet 3 inches thick. Where thickest it generally carries several thin bone partings. It has been mined in many places for local use.

This coal has been mined extensively in Benzinger township. In the vicinity of St. Marys it is 3 feet thick, including 6 inches of bone coal, 6 inches from the top. The coal is high in ash and sulphur.

The Clermont bed is less than 2 feet thick in the northern and western townships. It has also been eroded in large areas.

The following sections are characteristic of the Clermont coal in Elk County:

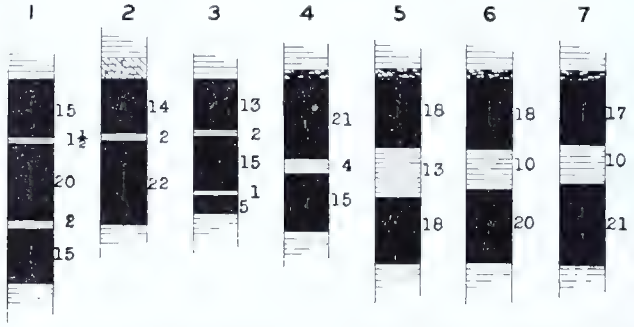


Figure 73. Sections of Clermont (Clarion or Brookville) coal in Elk County.

1. Glen Run Coal Corporation. Eskey No. 1 mine, near Dagus Mines on P. S. & N. R. R., Fox township.
2. McCullough Coal Company. Averyville mine, on P. S. & N. R. R. about 3 miles southeast of St. Marys, Benzinger township.
3. Star Coal & Clay Company. Star mine, on P. S. & N. R. R. 3 miles southeast of St. Marys, Benzinger township.
4. Haberberger Coal Company. Haberberger mine, 3 miles northeast of St. Marys, Benzinger township.
5. Wm. Harriger. Harriger No. 3 mine, on P. R. R. 5 miles east of St. Marys. Benzinger township.
6. Kronenwetter Coal Company. Kronenwetter mine, on P. R. R. 5 miles east of St. Marys, Benzinger township.
7. West Branch Coal Company. Benzinger No. 1 mine, on P. R. R. 5 miles east of St. Marys, Benzinger township.

LOWER KITTANNING (B, DAGUS) COAL.

The Lower Kittanning is the most important and extensively mined coal in Elk County, forming fully 90 per cent of the production. It ranges from 2 to 5 feet thick, averaging about 3 feet.

The Lower Kittanning is mined extensively on Bennetts Branch in Benezette and Jay townships. It ranges from 2 feet 6 inches to 3 feet 4 inches thick, averaging 2 feet 10 inches. In some places the coal is clean, but generally it carries many streaks of bone and pyrite. It is 2 feet 10 inches thick at Dents Run, and 3 feet 4 inches at Benezette; at Averyville 3 feet 2 inches, including a 6-inch binder of black slate, 8 inches from the top. It is 3 feet 2 inches thick at Weedville. At Tyler, Force, and Major the coal is persistently 3 feet 4 inches thick, including 4 inches of bony coal at the top.

The Lower Kittanning is mined extensively at Kersey, Dagus and Toby mines in Fox township. It ranges from 2 feet 6 inches to 3 feet 6 inches thick, averaging about 3 feet. It carries a sulphur binder ¼ inch thick, 2 feet above the bottom.

The following sections are typical of the Lower Kittanning in Elk County:

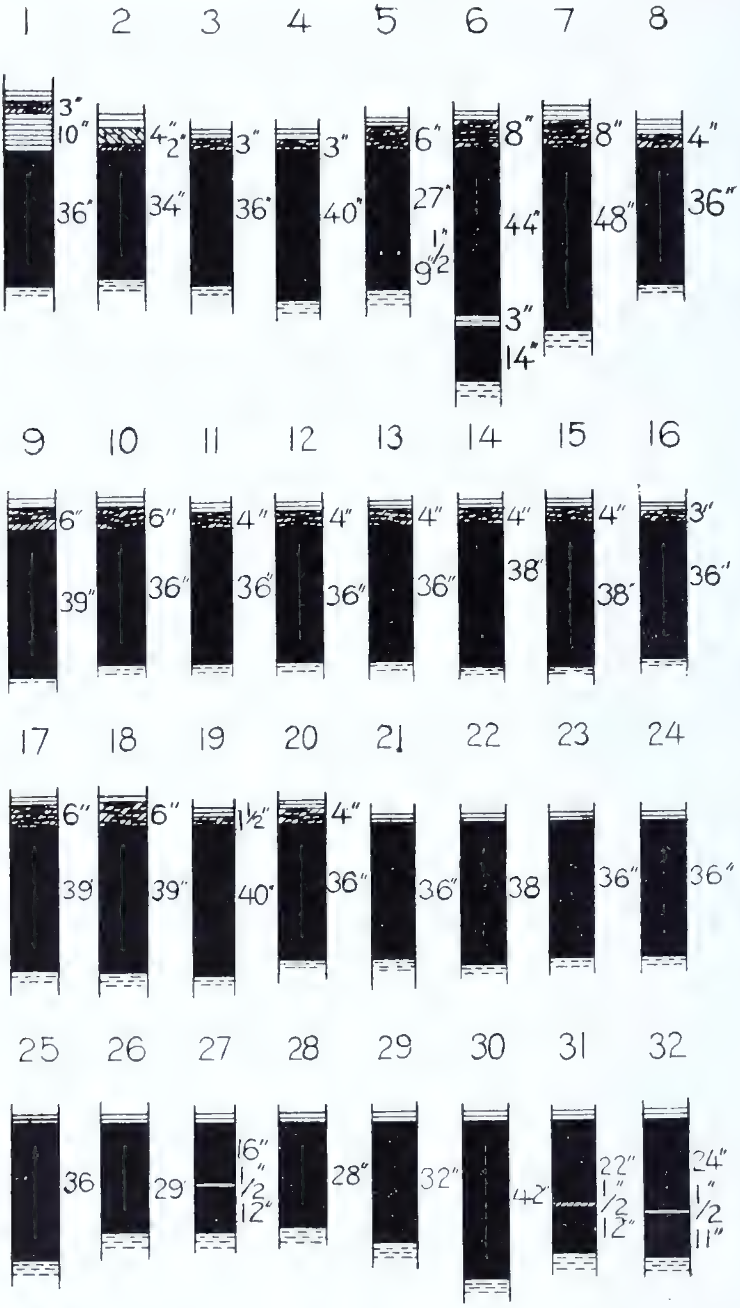


Figure 74. Sections of Lower Kittanning coal in Elk County.

1. Bennetts Branch Coal Company. Dents Run No. 1 mine, on Dents Run, 2 miles northwest of Dents Run town, Benezette township.
2. Bennetts Branch Coal Company. Dents Run No. 2 mine, on Dents Run, 2 miles northwest of Dents Run town, Benezette township.
3. Bennetts Branch Coal Company. Dents Run No. 6 mine, on Dents Run, 3 miles northwest of Dents Run town, Benezette township.
4. E. J. Winslow Coal Company. Winslow No. 2 mine, on Dents Run, 3 miles northwest of Dents Run town, Benezette township.
5. Harriger Coal Company. Harriger No. 2 mine, ½ mile east of Caledonia, Jay township.
6. Hayes Bros. Hayes No. 1 mine, ½ mile east of Caledonia, Jay township.
7. Weed & Burch Coal Company. Thurston mine, 1 mile northeast of Caledonia, Jay township.
8. Shady Valley Coal Company. Shady Valley No. 1 mine, at Byrnedale, Jay township.

9. Shawmut Mining Company. Elk No. 31 mine, at Byrnedale, Jay township.
10. Bucktail Coal Company. Bucktail Nos. 2 & 3 mines, at Weedville, Jay township.
11. J. H. Burke Coal Company. Burke mine, 1 mile west of Weedville, Jay township.
12. Penfield Coal & Coke Company. Penfield No. 2 mine, 3 miles northeast of Tyler on the right bank of Bennetts branch, Jay township.
13. Witten Coal Company. Witten No. 2 mine, 1 mile northeast of Tyler, Jay township.
14. John Palumbo. Palumbo mine, near Tyler, Jay township.
15. Under Hill Coal Company. Under Hill mine, near Tyler, Jay township.
16. Shawmut Mining Company. Proctor mine, 1 mile northwest of Force, Jay township.
17. Weed & Burch Coal Company. Force No. 52 mine, 2 miles west of Weedville, Jay township.
18. Assalone Coal Company. Assalone No. 2 mine, 1½ miles northwest of Force, Jay township.
19. Toby Coal Mining Company. Five Points Nos. 2 & 3 mines, 2¾ miles northwest of Tyler, Fox township.
20. Gail Coal Company. Gail mine, 2¾ miles northwest of Tyler, Fox township.
21. Hacherl Coal Company. Hacherl mine, at Kersey, Fox township.
22. Northwestern Mining & Exchange Company. Eureka Lower mine, near Coal Hollow, 9 miles southeast of Ridgway, Fox township.
23. Northwestern Mining & Exchange Company. Dagus No. 1 mine, near Maplehurst, 9 miles southeast of Ridgway, Fox township.
24. Ridgway Coal Company. Cartwright mine, near Kylers Corners on Toby Creek Branch of Erie Railroad, Fox township.
25. T. J. Williams. Glo-Gora mine, near Elbon, Fox township.
26. Jackson-Harrigan Coal Company. Pauley mine, 2 miles northeast of Brandy Camp, Fox township.
27. Shawmut Mining Company. Shawmut No. 5 mine, at Brandy Camp, Horton township.
28. Victory Coal Company. Victory mine, 1 mile northeast of Brandy Camp, Horton township.
29. Brandy Camp Coal Company. Brandy Camp mine, on P. S. & N. R. R. between Elbon and Brandy Camp, Horton township.
30. Elk Coal Company. Elk mine, on Brandy Camp Creek near Elbon, Horton township.
31. Shawmut Mining Company. Shawmut No. 7 mine, near Drummond, Horton township.
32. Shawmut Mining Company. Shawmut No. 10 mine, near Drummond, Horton township.

The Lower Kittanning is mined on the Pittsburgh, Shawmut, and Northern, and the Erie railroads in Horton township. It is 3 feet 2 inches thick at Brandy Camp, not including a top bony bench from 2 to 6 inches thick. It is 2 feet 10 inches thick at Cuneo, and 3 feet thick at Elbon. The coal is free from partings and binders, but locally carries a few inches of bone at the top. At Drummond the bed is 2 feet 10 inches to 3 feet thick, and has a clay and bone parting, ½ inch thick, approximately 12 inches above the bottom.

In Benzinger township the Lower Kittanning coal ranges from 2 feet 10 inches to 3 feet 6 inches thick, but is high in sulphur and ash.

In Jones, Ridgway, and Spring Creek townships the coal ranges from 2 feet to 3 feet 2 inches thick. The coal is high in sulphur, and roof rolls make mining uncertain.

The Lower Kittanning coal is soft, but makes fair-sized lumps when properly mined. It has a bright luster and imperfect cubical cleavage. It averages about 31 per cent volatile matter, 59 per cent fixed carbon, 7 per cent ash, and 2.5 per cent sulphur.

MIDDLE KITTANNING (C) COAL.

The Middle Kittanning coal, lying about 50 feet above the Lower Kittanning, is thin and unimportant in Elk County. It is locally 3 feet thick, but averages less than 12 inches.

UPPER KITTANNING (C′) COAL.

The Upper Kittanning coal, lying about 40 feet above the Middle Kittanning coal, is a thin bed averaging about 9 inches thick. It is entirely lacking in large areas. The Upper Kittanning is being mined at two places in Horton township. It averages 2 feet 8 inches thick, including a bone parting, ½ to 1 inch thick, at various positions in the bed.

LOWER FREEPORT (D) COAL.

The Lower Freeport coal is everywhere thin and unimportant in the county, except in the northeastern extension of the Reynoldsville basin in Horton and Fox townships. Here it is 3 feet to 4 feet 6 inches thick, and is generally without partings or binders.

UPPER FREEPORT (E) COAL.

The Upper Freeport coal, lying about 45 feet above the Lower Freeport, has been largely eroded, being present only as isolated patches in the hills in the southern part of the county. It is usually a thick bed, locally measuring 6 feet, but commonly occurring in two 3-foot benches, separated by 6 to 20 feet of shale.

CHAPTER XIII.

FAYETTE COUNTY

INTRODUCTION.

Coal was first discovered and burned in Fayette County in 1759. From that early date production has steadily increased until the county is the largest producer of bituminous coal in Pennsylvania. This preeminence is due to the easy accessibility of large acreages of Pittsburgh coal, to its quality as a gas, steam, and coking coal, and to ample transportation facilities, both by water and rail.

Fourteen coal beds in the county are locally minable. More than twenty other coals are not minable. The importance of the Pittsburgh bed has so overshadowed the other beds in the county that they are little developed. With the steadily approaching exhaustion of the Pittsburgh bed, these thinner coals will gradually assume importance, and will finally furnish the entire output of the county. This state of affairs has been long recognized, but it is only in the last few years that any considerable prospecting of these beds has been done. Even at the present time there are areas, principally in the coals of the Allegheny group, in which little prospecting has been done.

The county has a network of steam railroads. The Baltimore and Ohio Railroad follows the east bank of Youghiogheny River across the county and with its branches opens up the district on the east side of the river. It gets some coal by chutes and aerial trams from the west side of the river. The Connellsville-Clarksburg branch of the Baltimore and Ohio Railroad opens up large fields in the southern part of the county. The Pennsylvania Railroad has many lines throughout the county. The Monongahela Division follows Monongahela River along the entire west boundary of the county; the Fairchance-Greensburg Division with its branches reaches many mining localities in the central part of the county. The main line of the Western Maryland Railroad follows the west bank of Youghiogheny River from Confluence to Connellsville, where it connects with the Pittsburgh and Lake Erie Railroad which follows the Youghiogheny to Pittsburgh. The Pittsburgh and Lake Erie Railroad runs along Monongahela River between Pittsburgh and Brownsville.

Monongahela River has been used extensively since 1841 for the transportation of coal mined in Fayette County.

Fayette County has many improved roads and many miles of dirt roads that are kept in good condition. During war time much coal was hauled to sidings for shipment. At present very little coal is hauled over the highways for shipment by railroad.

The country east of the western base of Chestnut Ridge is a series of long narrow ridges, roughly parallel, having a general northeast-southwest trend, and separated by rather wide valleys much dissected by mountain streams. Elevations of 2800 feet are common on Laurel Ridge. Viewed from these high points the region to the west appears to be a featureless plain. It is in reality, a country of rolling land and numerous hills with gentle slopes, ranging from 1200 to 1300 feet in elevation; a much dissected peneplain. The slopes are steep where the streams have entrenched themselves or cut across anticlines. Youghiogheny River has cut a deep gorge across the Ligonier Valley. Remnants of old stream terraces and channels line the slopes of the Monongahela.

STRUCTURE.

There are ten major structural features in the county, each affecting the position of the coal beds. These are, in order from east to west: Laurel Hill anticline, Ohiopyle syncline, Chestnut Ridge anticline, Elliottsville syncline, Dulaney anticline, Uniontown syncline, Fayette anticline, Lambert syncline, Brownsville anticline, and Port Royal syncline. Each structure has a northeast-southwest trend.

The structure contours of the county were originally drawn on the top of the Pottsville sandstone and the bottom of the Pittsburgh coal because of the uniformity and persistence of those rocks throughout the county.

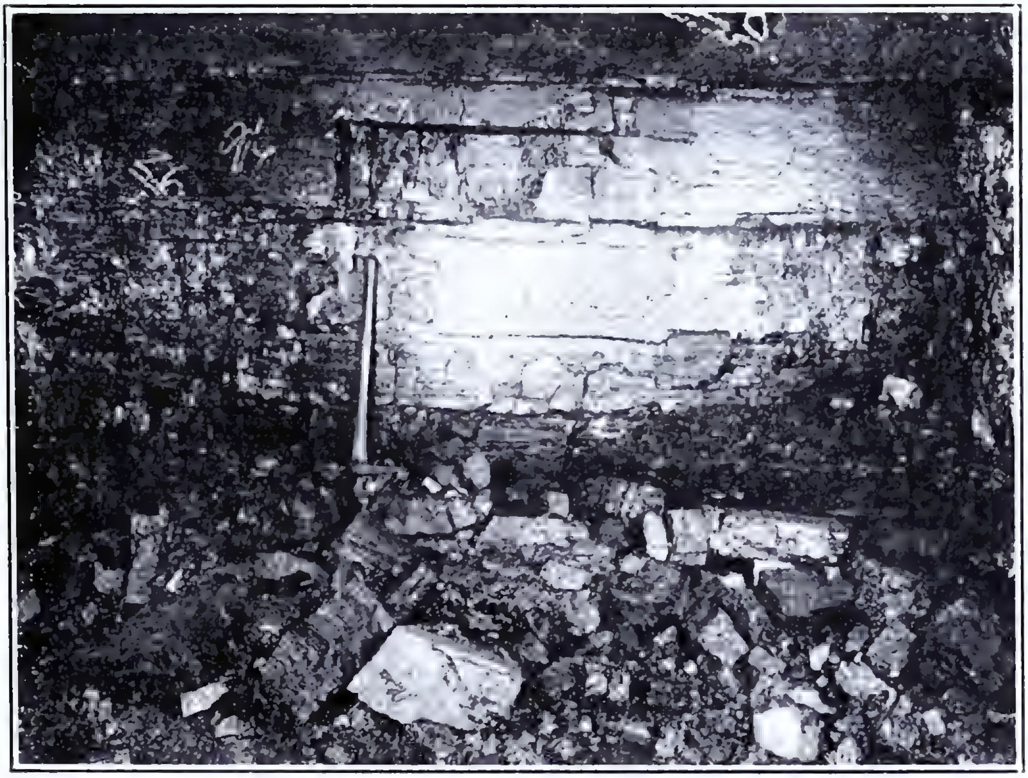
Laurel Hill anticline, a great fold at the eastern edge of the county, brings to light the erosion-resisting members of the Mississippian series, which make rugged mountain topography of steep slopes and deep narrow valleys. Its axis is well-defined, and plunges rapidly southwest, with a resulting steep dip into the syncline on the northwest.

Ohiopyle syncline, the southern extension of Ligonier syncline, is a well-defined basin. In the southern part of this basin the rocks rise gently to the southeast. Northeast at Confluence the slopes become rapidly steeper. Its axis tails out just north of Elliottsville, and Chestnut Ridge anticline begins near the same locality. The slopes west of the basin are regular and gentle.

Chestnut Ridge anticline makes its appearance just north of Elliottsville, as a minor fold, with gentle slopes. Near Youghiogheny River the slopes increase; the axis is level, and the slopes

PLATE XI.

A. Coal mining town in Fayette County.



B. Pittsburgh coal bed in Fayette County mine, showing cleavage planes.

are about equal on both flanks. North of the Youghiogheny the fold is greater, and forms the highest structural feature west of Laurel Hill anticline. Altitudes of 2300 feet above sea on the Pottsville sandstone are common.

Elliottsville syncline, a minor structure associated with Ohiopyle syncline, extends north from West Virginia, just west of Elliottsville, to a point south of Youghiogheny River where it fades out between Chestnut Ridge and Dulaney anticlines. Its eastern slope is very gentle; on the western slope the rocks rise 600 to 700 feet to the mile and form Dulaney anticline.

Dulaney anticline, the next structural feature west, is a minor fold where it originates just across the State line in West Virginia; its axis rises rapidly to the northeast until the Pottsville sandstone has an altitude of 3200 feet on the axis of the fold south of the summit. Toward Youghiogheny River the fold gradually widens and the slopes become low and gradual.

Uniontown syncline, forming the well-known Connellsville basin in Fayette County, is the largest structural feature in the county west of Chestnut Ridge anticline. The deepest part of this basin is 3½ miles northeast of Uniontown, where the Pittsburgh coal is 550 feet above sea level and 600 feet below the highest hilltops. The basin is unsymmetrical in cross section. The eastern flank is narrow and the slope steep; the western flank is wider, and the slope more gentle. The bottom of the basin is flat, and has a maximum width of about 1½ miles. The axis rises toward the south. The northern end is rounded and canoe-shaped.

Fayette anticline forms the western flank of the Connellsville basin. This fold gradually increases northward across the county, and reaches its maximum development in Youghiogheny River area. Its greatest altitude of 1800 feet is reached on the Fayette-Westmoreland county line, just northwest of Tyrone Mills on Jacobs Creek. The slopes on both flanks are gentle.

Lambert syncline, lying west of Fayette anticline, is a basin somewhat deeper but not as regular as that formed by Uniontown syncline. Lambert syncline originates in Greene County and deepens northward to its greatest depth just west of New Salem, where the Pittsburgh coal lies at an elevation of 450 feet above sea. The rocks rise rapidly on the east to the crest of Fayette anticline; on the west the slopes are more gentle.

Brownsville anticline is a minor structure composed of a series of elongated domes along a common axis. The Pittsburgh coal has an altitude of 800 feet at Brownsville and at Gillespie north of which place the axis plunges sharply.

The southern tip of Port Royal syncline extends into the county, but is an unimportant structural feature.

STRATIGRAPHY.

The Quaternary, Carboniferous, and Devonian systems have outcropping members in Fayette County. The Quaternary is represented by recent sand, clay, and gravel deposits along river banks and terraces; the Carboniferous system is represented by both the Pennsylvanian and Mississippian series of sedimentary rocks, comprising shales, clays, sandstones, limestones, and coals. The outcrops of Devonian rocks are limited to the Catskill group, composed of olive-green and red shales.

The Pottsville series, and the Allegheny, Conemaugh, Monongahela, Washington, and Greene groups of the Carboniferous system are all coal bearing.

The Washington and Greene groups are present where Uniontown and Lambert synclines have deeply buried the lower rocks. These groups are composed of shaly sandstone and sandy shale, with numerous thin limestones, and several coal beds, some of which are workable. In Greene County the maximum thickness of these groups is 1100 feet. In Fayette County, however, only 400 feet is present, the remainder having been eroded.

The Monongahela group is composed of calcareous shales, sandstones, limestones, and coal beds. It has been eroded in large parts of the county. Its maximum thickness is 400 feet where it remains intact under the Washington group.

The Conemaugh group is present in two-thirds of the county and outcrops on the flanks of the structural folds. This group is composed of shales, limestones, sandstones, and many coal beds, few of which are minable. Its average thickness is about 580 feet.

The Allegheny group is present in the entire county with the exception of spots on the anticlines where it has been eroded. It has an average thickness of 270 feet and is composed of sandstones, shales, limestones, and several valuable coal beds, associated with clays which are locally valuable.

The Pottsville group is composed of two massive sandstones, variable in thickness, with shale and one unimportant coal between them. Its maximum thickness rarely exceeds 100 feet.

The Devonian rocks have a limited outcrop on the largest anticlines. They are not coal bearing.

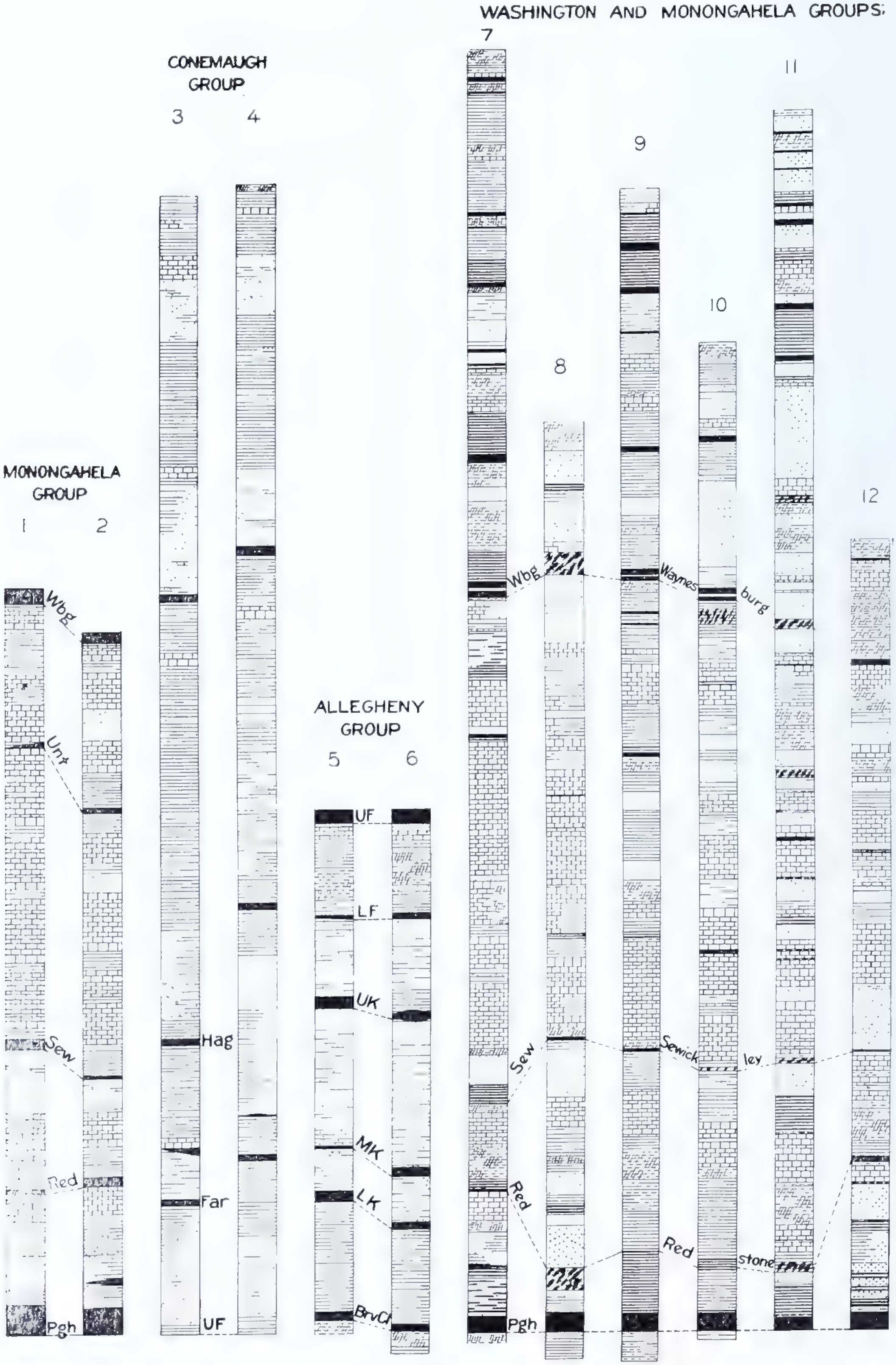


Figure 75. Stratigraphic sections, Fayette County.

1. Generalized section, Monongahela group. U. S. G. S. Masontown-Uniontown Folio.
2. Generalized section, Monongahela group. U. S. G. S. Brownsville-Connellsville Folio.
3. Generalized section, Conemaugh group. U. S. G. S. Masontown-Uniontown Folio.
4. Generalized section, Conemaugh group. U. S. G. S. Brownsville-Connellsville Folio.
5. Generalized section, Allegheny group. U. S. G. S. Masontown-Uniontown Folio.
6. Generalized section, Allegheny group. U. S. G. S. Brownsville-Connellsville Folio.
7. H. C. Frick Coke Co. Lambert shaft, German township
8. H. C. Frick Coke Co. Sarah hoisting shaft, Luzerne township.
9. H. C. Frick Coke Co. Filbert air shaft, Redstone township.
10. H. C. Frick Coke Co. Diamond drill hole at Orient, Redstone township.
11. H. C. Frick Coke Co. Brier Hill No. 1 shaft, Redstone township.
12. H. C. Frick Coke Co. Buffington shaft No. 1, Menallen township.

COALS.

The correlation of the coals in Fayette County is based on the reports of the Second Pennsylvania Geological Survey, and the Masontown-Uniontown and the Brownsville-Connellsville folios of the United States Geological Survey. These reports were made when the Pittsburgh coal was the only bed being mined commercially, and more attention was given to it than to the other coal beds. Since these reports were published no detailed geological work has been done. The writer recently made a reconnaissance of the newly developed areas and checked many correlations. The correlations in this report, therefore, are subject to revision when a detailed resurvey of the economic resources of the county is made. However, with the well-known Pittsburgh coal as a datum, the correlations of the other beds may be assumed as reasonably correct.

Generalized section of coal beds, Fayette County

Group	Coal bed	Average interval in feet	Average thickness	
			Ft.	in.
Washington	Washington		0	10
		100		
	Waynesburg A		1	0
		60		
Monongahela 375	Waynesburg		2	3
		75		
	Uniontown		1	0
		160		
	Sewickley		2	0
		70		
	Redstone		2	5
		70		
	Pittsburgh		9	0
		210		

Generalized section of coal beds, Fayette County.

Conemaugh 600	Wellersburg		1	0
		235		
	Hager		1	8
		90		
	Farmington		1	8
		70		
Allegheny 275	Upper Freeport		2	5
		50		
	Lower Freeport		1	5
		50		
	Upper Kittanning		1	9
		70		
	Middle Kittanning		0	9
		25		
	Lower Kittanning		2	0
		80		
	Brookville-Clarion		1	3
		125		
Pottsville 180±	Mercer		1	0

MERCER COAL.

The Mercer coal has a limited outcrop in the county. It is best exposed along Youghiogheny River, where it averages less than 12 inches, but locally is over 2 feet thick. Openings made for local use are now fallen shut. The bed was opened at Wharton Furnace on Chaney Run to make coke for use in the old furnace but the coke was poor. On Braddock Run the coal has a maximum thickness of 4 feet, but is dirty at the top. It has possibilities as a domestic fuel east of Chestnut Ridge in the vicinity of the National Pike. A coal bed which has been prospected 2½ miles south of Tyrone Mills in the northern part of the county is 4 feet thick including two thin bone partings, and is believed to be the Mercer coal. This coal, reported in several drill holes, varies from a few inches to 4 feet thick. The coal is high in ash and sulphur; its fixed carbon and volatile matter are medium.

BROOKVILLE (A)—CLARION (A′) COAL.

A bed about 30 feet above the Homewood sandstone and called the Brookville-Clarion coal for lack of better correlation, is locally a good clean coal of minable thickness. It changes within a few hundred feet to an impure coal, extremely high in ash and sulphur, carrying numerous clay partings that make it unminable. Where at its best it is a low-sulphur, low-ash coal, fairly high in fixed carbon.

The bed is thickest and cleanest on the west side of Chestnut Ridge where it was used in the furnaces in the early days of the iron ore industry in Fayette County. It was opened on Cheat River where it occurs in two benches; a top one 2 feet 6 inches thick, separated by nearly 4 feet of iron ore from a lower bench 18 inches thick. It was also mined many years ago in north Union township, and measured 8 feet 5 inches, including two clay partings, 1 and 3 inches thick. The coal had fair quality, medium in ash, fairly high in sulphur, and rather high in fixed carbon.

Along the Youghiogheny the Brookville-Clarion coal is clean but varies from a few inches to 3 feet in short distances. On Bear Run it is 2 feet 8 inches thick; at Ohiopyle 2 feet 2 inches; at Oakland 18 inches to 2 feet thick. The bed appears to be thin but persistent on and east of Chestnut Ridge.

Lower Kittanning (B) Coal.

Except in the Confluence-Indian Creek district, the Kittanning coals are deeply buried, and little is known of their thickness or quality. Large areas are untested, and the correlation of the beds is uncertain.

The Lower Kittanning coal averages less than 2 feet thick where it has been recognized in the county. It is thickest and best on Indian Creek, where it is mined extensively for shipment as a steam coal. The bed averages 3 feet 8 inches thick, and contains an average of 3 per cent sulphur. The roof commonly is shale, with an average of 6 inches of bony coal beneath it. This bony coal is separated from the main coal by a bone parting ½ inch thick. The main coal locally has one or two bone binders from 1 to 2 inches thick near the middle. The coal is medium in hardness and mines out in sticks, because of its closely spaced columnar cleavage planes. The coal ranges from 1.8 to 8 per cent sulphur, and from 4.1 to 20.8 per cent ash.

The bed is mined in the vicinity of Dunbar where it occurs in two benches, a top one of good clean coal 2 feet 2 inches thick, separated from a lower bench by a thin bone or clay parting. The lower bench is 14 inches thick; the coal is hard but has many sulphur bands. A 6-foot bed of clay directly underlying it is mined for brick making.

The coal is thin and very impure in many places, but future prospecting may discover areas where it can be mined profitably.

In mapping the Uniontown quadrangle little attention was paid to the coals of the Allegheny group. This group outcrops in the townships east of Chestnut Ridge and is the coal-bearing group between this ridge and Laurel Hill. The outcrop of the Lower Kittanning is extensive in Wharton, Stewart, Dunbar, and Henry Clay townships. The Lower Kittanning, as is characteristic of most Allegheny coals, is not persistent in physical character in large areas. Its chief importance in the area drained by the southern tributaries of Youghiogheny River in Fayette County is for farm fuel. Numerous country banks have been opened in this bed and some of them have revealed coal 5 or 6 feet thick. These thicknesses appear to be abnormal for this bed, as its general average throughout the entire area is probably 3 feet. It thickens and thins locally, is dirty in some localities and clean in others. In Wharton township the bed usually occurs in two benches separated by a bone coal parting 1 to 4 inches thick. The upper bench usually ranges from 12 inches to 1 foot 8 inches thick. The bottom bench is of practically the same thickness. Locally a lower bench is present, separated from the middle bench by a 2-inch shale parting. This lower bench rarely exceeds 12 inches in thickness. The bed appears to be less than 2 feet 6 inches thick in most of Henry Clay township. Where it has been opened the coal is very clean with the exception of nodules of sulphur and bone.

The Lower Kittanning is being mined for shipment in Stewart township in the vicinity of Ohiopyle. Here the coal generally occurs in two benches, the top one ranging from 4 to 6 inches thick separated from the bottom bench by a shale parting 5 to 8 inches thick. The bottom bench ranges from 2 feet 7 inches to 3 feet 4 inches thick. Locally the lower bench is divided by a bone coal parting, 2 inches thick, 12 inches from the bottom. A few inches at the bottom of the lower bench is somewhat bony.

The Lower Kittanning is mined by a few companies in Springfield township. It usually occurs in two benches, the top ranging from 12 inches to 1 foot 10 inches thick, and the bottom usually 2 feet thick. Locally it occurs as a solid bed ranging from 2 feet to 4 feet 2 inches thick. In these areas the bed has 6 inches of bony coal on the top.

The Lower Kittanning is very important in Saltlick township and it is being mined on Indian Creek by numerous companies. In this area it occurs in a single bench from 2 feet 10 inches to 3 feet 11 inches thick. The average thickness is approximately 3 feet. The bed is overlain by a bony bench 6 to 8 inches thick. The coal has good quality and is used extensively for steaming purposes.

The Lower Kittanning outcrops west of Chestnut Ridge in Springhill, Georges, South Union, North Union, and Dunbar townships. It is not being mined in Springhill township where its outcrop indicates that the coal is rather impure. Three shale and bone partings, ranging from ½ inch to 2 inches thick, separate the coal into four benches. The aggregate thickness of the entire bed is usually between 3 feet 6 inches and 4 feet. One of the shale partings disappears northward into Georges township and the coal occurs in three benches separated by bone and shale partings 2 to 3 inches thick. The top bench ranges from 12 inches to 2 feet thick, the middle bench from 14 inches to 1 foot 10 inches thick, and the bottom bench usually is 12 inches thick. Many departures from this average section are noticed on its outcrop. In South Union township, where the Lower Kittanning outcrops the west flank of Chestnut Ridge, its physical character is also variable. In some localities it will undoubtedly have much future value although it averages less than 3 feet thick. It is generally overlain by a bony coal bench 5 inches thick. The top bench ranges from 12 inches to 2 feet 2 inches thick and is separated from a middle bench, 6 inches thick, by a bone coal parting ranging from ½ inch to 3 inches thick. The middle bench is separated from the lower bench by a bone parting averaging 2 inches thick. The bottom bench is variable in thickness and probably averages approximately 14 inches.

In North Union township the bed has practically the same physical character but locally occurs in two benches overlain by bone coal 6 to 10 inches thick. The top bench averages about 16 inches thick and the parting ½ inch to 3 inches thick. The bottom bench averages less than 12 inches thick.

The Lower Kittanning outcrops in Dunbar township in the vicinity of Dunbar. It has been prospected, but little value is given it. It is usually very thin, averaging less than 3 feet. It occurs in two benches separated by a shale parting 1 to 3 inches thick. The top bench averages 14 inches thick and the bottom bench ranges from 10 to 16 inches thick.

The following sections are characteristic of the Lower Kittanning coal in Fayette County:

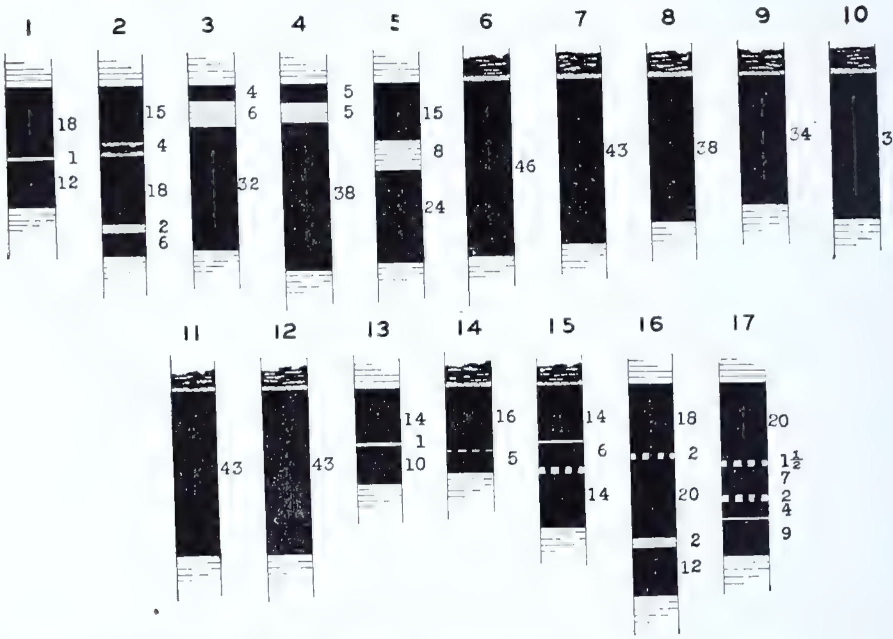


Figure 76. Sections of Lower Kittanning coal in Fayette County.

1. Outcrop on Little Sandy Creek near eastern Wharton township line, Wharton township.
2. Outcrop on Chaney Run, 1¼ miles southeast of Wharton Furnace.
3. Anderson Coal Company. Kendall No. 1 mine, ¼ mile east of Ohiopyle Station, Stewart township.
4. Glotfelty Coal Company. Rush mine, in Ohiopyle, Stewart township.
5. Chas. Rose. Rose mine, at Rodgers Mills, Springfield township.
6. Barger Coal Company. Rice slope, ¼ mile west of Rodgers Mills, Springfield township.
7. Indian Creek Coal & Coke Company. Kuhns mine, ½ mile south of Indian Head, Saltlick township.
8. Indian Creek Coal & Coke Company. Sparks mine, at Indian Head, Saltlick township.
9. Sagamore Coal Company. Big Chief mine, at Sagamore, 1 mile northwest of Indian Head, Saltlick township.
10. Howard Coal Company. Kimmel mine, at Davistown, Saltlick township.
11. Melcroft Coal Company. Melcroft No. 1 mine, at Melcroft, Saltlick township.
12. Nebo Coal Mining Company. Mohawk No. 1 mine, at Nebo, Saltlick township.
13. Outcrop on south bank of Dunbar Creek, 1 mile east of Dunbar, Dunbar township.
14. Outcrop on west slope of Laurel Ridge, ½ mile east of Youngstown, North Union township.
15. Outcrop on national highway 1 mile east of Hopwood, South Union township.
16. Outcrop on south fork of Georges Creek, 1½ miles southeast of Haydentown, Georges township.
17. Outcrop on Chestnut Ridge 1 mile east of Emme, Springhill township.

Middle Kittanning (C) Coal.

The Middle Kittanning bed is rarely minable and in large areas is entirely absent. It is 3 feet thick on Jonathan Run, where it has been mined for house coal.

Upper Kittanning (C) Coal.

The Upper Kittanning coal is present in several townships but is workable only in the Confluence-Indian Creek district, and in isolated tracts in the central and western parts of the county. The coal is more or less dirty, carrying either bone or clay partings, or several inches of bony coal at the top of the bed. The presence of sulphur balls locally makes it very high in sulphur. The ash ranges from 2.5 to 13 per cent.

The Upper Kittanning is the most valuable and the only bed mined in the Confluence area. It is mined by drift along its outcrop on Youghiogheny River. It is characteristically a double bed, with a fire clay parting 6 inches to 6 feet thick. The upper bench of good coal ranges from 1 foot 6 inches to 6 feet thick. The upper bench of good coal ranges from 1 foot 6 inches to 3 feet thick. The lower bench is from 1 foot to 2 feet 6 inches thick, and is rather high in sulphur.

The coal outcrops in many other localities and ranges from a few inches to 4 feet thick. Where thickest it carries several bone or shale partings which lessen its value. The Upper Kittanning is better than the lower Kittanning in most places. The sulphur content averages less than 3 per cent, and the ash approximately 7 per cent. The fuel ratio is always about 3.

The Upper Kittanning, like the Lower Kittanning, has a very extensive outcrop in the townships between Chestnut Ridge and Laurel Hill. The information concerning the thickness and quality of this bed is meager as the territory which contains it is very thinly populated and transportation facilities are very poor. This bed has been opened at many localities for local use, and these openings indicate that its thickness and persistence is extremely variable. Some areas contain coal of merchantable thickness and quality; in others the upper Kittanning is either too thin or too dirty to be profitably mined. It has no constant physical character to identify it readily.

In Henry Clay township it usually occurs in two benches separated by a shale parting 1 to 3 inches thick. The top bench ranges from 2 feet 3 inches to 3 feet 2 inches thick. The bottom bench ranges from 3 to 16 inches thick and is usually bony and not mined.

The Upper Kittanning, where it is mined in the vicinity of Ohiopyle, has attained commercial importance, although it contains much shale and bone which must be picked out of the coal when it is mined. The bed usually occurs in three or more benches separated by bone and shale partings ranging from 1 to 10 inches thick. The coal is rather high in ash and sulphur. The total thickness of the bed ranges from 2 feet to 3 feet 6 inches.

The Upper Kittanning is being mined at Rodgers Mills in Springhill township where it occurs as a single bench 4 feet thick. The coal contains numerous bone and shale partings having a high sulphur content. These partings can not be entirely separated from the coal.

The Upper Kittanning outcrops on the west flank of Chestnut Ridge. It has been prospected at several points but its thickness and chemical character have not warranted opening it while the Pittsburgh and Sewickley beds are still producing coal. At the localities which were examined the Upper Kittanning does not exceed 3 feet thick, and averages considerably less. In some localities it is a clean bed averaging 2 feet thick; in others, shale and bone partings have swelled it to 5 and 6 feet. It has been mined in the vicinity of Dunbar where it occurs as a single bench 2 feet 4 inches thick. The coal has fair quality.

Youghiogheny River has cut through Fayette anticline in northern Franklin township and has exposed the Allegheny coals. At this point the Upper Kittanning has been mined. It is 2 feet 8 inches thick including two bone partings, the upper 1 inch thick, and the lower 2 inches thick. The top bench of coal ranges from 3 to 7 inches thick, the middle 5 to 10 inches, and the bottom 14 to 18 inches.

The future of the Upper Kittanning coal in Fayette County is uncertain, but it will undoubtedly be of some commercial value where thickest. It has been drilled through in search of oil and gas, and these records indicate that it is of commercial thickness in many townships where it does not outcrop. Because of its variability the expenditure of large sums in sinking shafts to it probably is not warranted.

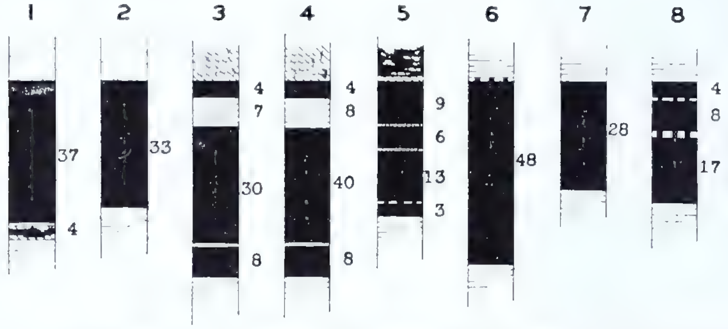


Figure 77. Sections of Upper Kittanning coal in Fayette County.

1. Laurel Coal Mining Company. Kephart mine, on Rameat Run, ¼ mile south of Huston, Henry Clay township.
2. Anderson Coal Company. Kendall No. 2 mine, at Ohiopyle, Stewart township.
3. Riverside Coal Company. Bailey mine, ¾ mile west of Ohiopyle on east bank of Youghiogheny River, Stewart township.
4. Eyre Fuel Company. Jim Run mine, 1¼ miles north of Ohiopyle on east bank of Youghiogheny River, Stewart township.
5. East Fayette Company. Torrence mine on Cucumber Run, Stewart township.
6. Rogers Coal Company. Rogers No. 2 mine, at Rogers Mills, Springfield township.
7. G. Coffman. Coffman mine, 1 mile east of Dunbar, Dunbar township.
8. Outcrop on Virgin Run, 1¼ miles west of Darnley, on Youghiogheny River, Franklin township.

LOWER FREEPORT (D) COAL.

The Lower Freeport coal is the most irregular bed in the Allegheny group in Fayette County. It ranges from a few inches to 5 feet thick, carries bone or clay partings, and never is clean. Where thickest the partings are numerous.

This bed has been mined on Indian Creek, where its maximum thickness is 5 feet, including at least two binders having a total thickness of over 12 inches. The top bench, usually 3 feet thick, is good coal. The lower bench is seldom mined. Several mines were opened in this bed when the prices of coal were high, but it is doubtful if the small mines can be operated at a profit in normal times.

The bed is thin and worthless almost everywhere in the Ligonier Valley, its average thickness being less than 1½ feet.

West of the Chestnut Ridge the bed is thicker, but is minable in few places. It is a thick bed in several townships, but three clay partings destroy its value.

At Dunbar the bed averages 2 feet 6 inches thick, and carries a 2-inch bone binder about 5 inches from the top. It is difficult to separate this binder from the coal. The coal is very low in sulphur, but high in ash.

The bed is usually concealed in the southern part of the county, but on Little Sandy Creek it is a good coal 4 feet thick. It is very thin in the northern part of the county and is not opened.

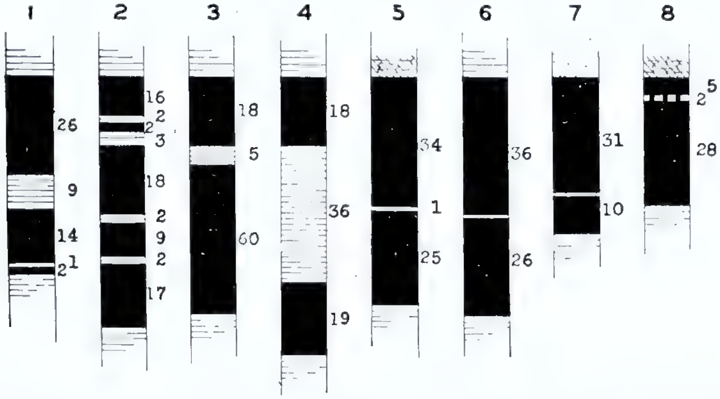


Figure 78. Sections of Lower Freeport coal in Fayette County.

1. Outcrop on Big Sandy Creek, ½ mile south of Elliottsville.
2. Outcrop on Meadow Run near southern Stewart township line, Stewart township.
3. Outcrop between Jonathan and Cucumber Runs, 1½ miles southwest of Ohiopyle, Stewart township.
4. Outcrop at Stewarton, on west slope of Youghiogheny River, Stewart township.
5. Campbell Coal Company. Campbell No. 3 mine, 1½ miles southeast of Normalville, Springfield township.
6. Campbell Coal Company. Campbell No. 1 mine, 1 mile southeast of Normalville, Springhill township.
7. Indian Creek Coal & Coke Company. Sparks No. 2 mine 1½ miles south of Normalville, on Indian Creek, Saltlick township.
8. Ainsley Heirs. Ainsley mine, ¾ mile southeast of Dunbar, Dunbar township.

UPPER FREEPORT (E) COAL.

The Upper Freeport bed is the most persistent of the Allegheny coals in Fayette County. Its thickness ranges from a few inches to 6 feet; it also ranges from a clean coal to a coal with many partings and high in iron pyrite. It is a well known bed in the eastern and central parts of the county where it outcrops, but in the western part of the county where it is deep under cover, it is known only from drill records.

Many openings have been made recently in this bed in Henry Clay and Stewart townships. The coal shows great variation in quality and thickness, but in most places is in two benches separated by 6 inches to 4 feet of fire clay. The top bench ranges from 6 inches to 3 feet, and the lower bench from 1 foot to 2 feet 6 inches thick. Locally two or more bone partings appear in the coal in addition to the main clay parting. Large areas in Springfield and Saltlick townships are yet unprospected, but may contain some mineral tracts.

The Upper Freeport coal has been opened in many places in the central part of the county. In Springfield, Georges, Wharton, Dunbar, and North and South Union townships, the bed averages about 4 feet thick, but has several thick bone and clay partings. Locally, however, it is thinner and cleaner.

Drill records indicate that the Upper Freeport coal is lenticular, but is thick and excellent in some of the townships bordering the Monongahela.

This coal ranges from 1.5 to 4 per cent sulphur, and from 6 to 15 per cent ash, depending upon the quantity of impurities left in the coal after it is mined. When the Pittsburgh coal has been worked out this bed will assume importance, as it is a fair steam coal. It does not make satisfactory coke.

The outcrop of the Upper Freeport is extensive in the townships between Chestnut Ridge and Laurel Hill. In the townships south of Youghiogheny River this bed is usually thicker than any other coal in the Allegheny group. It has been opened at numerous localities for local fuel. Its variability in physical character would make its identity uncertain if it were not for the Freeport limestone underlying it. In Henry Clay township the coal averages 4 feet 6 inches thick including its impurities which are usually in the form of shale, bone, and clay partings ranging from ½ inch to 2 feet thick. In the western part of Henry Clay township the bed is over 5 feet thick. It is divided into two benches by a clay parting ranging from 2 to 12 inches thick. The top bench averages approximately 2 feet 6 inches thick, and the bottom 2 feet 3 inches thick. On Hall Run the bed is practically the same character. At Somerfield the bed is separated into two divisions by a clay parting ranging from 12 inches to 2 feet thick. Both the top and bottom benches are subdivided by bone and shale partings ranging from ½ inch to 4 inches thick. In the northern part of Henry Clay township the bed again occurs in two benches separated by a clay parting 1 to 8 inches thick. The top bench is generally very thin; the bottom bench ranges from 2 feet 3 inches to 3 feet thick.

The physical character of the Upper Freeport is extremely variable in Wharton township but the bed is of minable thickness and quality practically everywhere. Locally the bed occurs in two divisions separated by a clay parting 12 inches to 3 feet thick. In other localities the bed is separated into four benches by clay and bone coal partings 1 to 4 inches thick.

The Upper Freeport appears to thin to the north in Stewart township, and averages approximately 3 feet thick. It is never entirely clean and is usually separated into three or more benches by bone and shale partings ranging from 1 to 8 inches thick.

The Upper Freeport is exposed on the western flank of Chestnut Ridge but has not been prospected to any great extent. Outcrops indicate that it has very good thickness and quality at many localities.

Its thickness and quality are very good in Dunbar township. It is being mined in the vicinity of Dunbar where it occurs in three benches separated by bone and shale partings 1 to 2 inches thick. The top bench ranges from 2 feet 3 inches to 2 feet 8 inches thick. The middle bench is usually 16 inches thick, and the bottom bench ranges from 8 to 14 inches thick.

The Upper Freeport is being mined in North Union township in the vicinity of Coolspring, and on the National Highway. In these localities the bed occurs in three branches separated by bone coal partings ½ inch to 10 inches thick. The top bench ranges from 16 to 18 inches thick, the middle bench from 16 inches to 1 foot 8 inches thick, and the bottom bench is usually approximately 10 inches thick.

On the southern continuation of the outcrop into Georges township the coal thickens locally to 7 and 8 feet including a clay parting 14 inches to 2 feet 6 inches thick which is usually very persistent in certain localities. A representative section of the Upper Freeport is on Black Creek, south of Fairchance. Here the coal occurs in three benches separated by clay partings 3 to 8 inches thick. The upper bench averages 2 feet 6 inches thick, the middle bench 18 inches, and the bottom bench 3 feet thick. This coal has very good quality but is locally split by thin lenses of bone and pyrite.

The Upper Freeport coal is mined in the vicinity of Connellsville in Connellsville township. Here it has an exceptional thickness of

5 feet 8 inches including three shale partings aggregating 8 inches in thickness. The main bench ranges from 2 feet 8 inches to 3 feet 4 inches thick, and is separated from a lower bench, generally 14 inches thick, by 1 inch of shale. In Lower Tyrone township, where the Upper Freeport is being mined, it averages 4 feet thick including approximately 2 inches of shale. The top bench averages 2 feet 7 inches thick, the middle bench ranges from 12 to 16 inches, and the bottom bench is usually 4 inches thick.

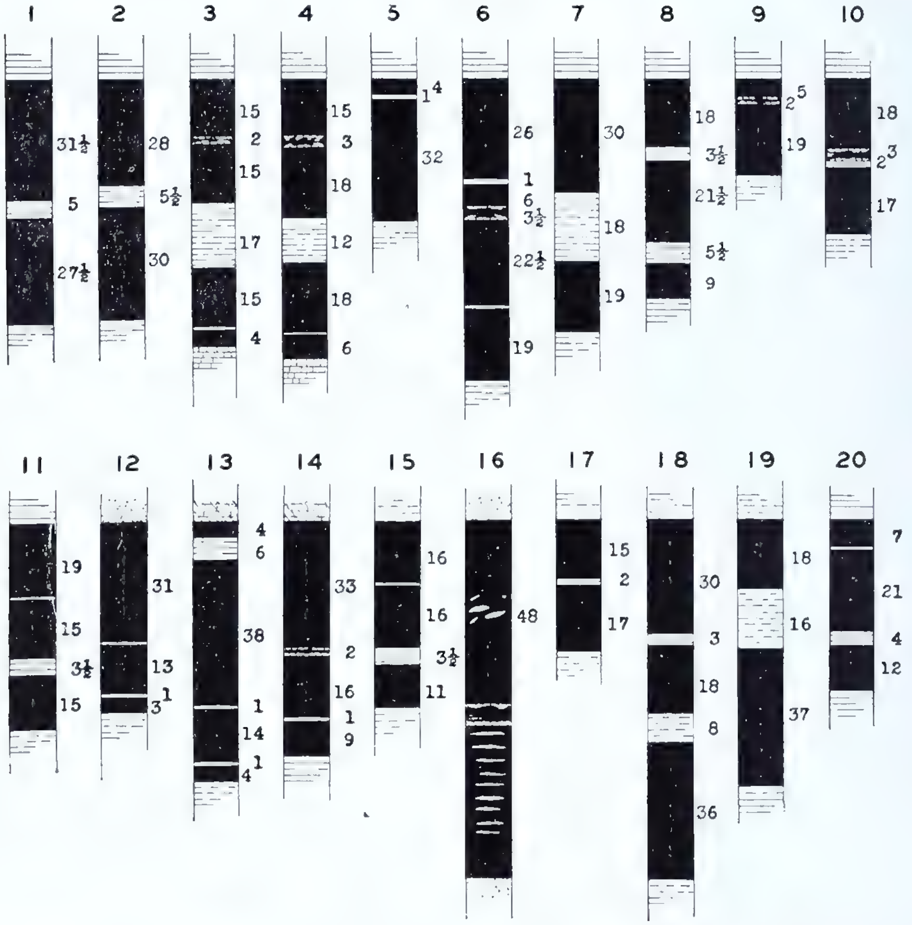


Figure 79. Sections of Upper Freeport coal in Fayette County.

1. Country bank, at western line of Henry Clay township on National Highway, Henry Clay township.
2. Outcrop on headwaters of Halls Run, on National Highway, Henry Clay township.
3. J. W. Endsley. Endsley No. 2 mine, at Somerfield, Henry Clay township.
4. Outcrop on Tub Run, 1½ miles northwest of Somerfield, Henry Clay township.
5. Outcrop on Ramcat Run, 1 mile southwest of Huston, Henry Clay township.
6. On Big Sandy Creek, ½ mile north of State Line, Wharton township.
7. Outcrop on Stony Run, 1 mile southeast of Farmington, Wharton township.
8. On Meadow Run, 1 mile south of its mouth, Stewart township.
9. Outcrop on Jonathan Run, Stewart township.
10. Outcrop on west bluff of Youghiogheny River, at Stewarton.
11. Outcrop on Bear Run, 1½ miles east of its mouth, Stewart township.
12. Youghiogheny Coal & Coke Company. Florence mine, at Tyrone Mills, Lower Tyrone township.
13. Walnut Hill Coal Company. Walnut Hill mine, at South Connellsville, Connellsville township.

14. American Manganese Mfg. Company. Furnace No. 2 mine, on Dunbar Creek, 1 mile southeast of Dunbar, Dunbar township.
15. Coolspring Coal Company. Springer mine, 3 miles east of Uniontown, on south side of Cool Spring, Hollow Road, North Union township.
16. American Coal, Oil, and Gas Company. Flint Rock mine, on National Highway, 1 mile southeast of Hopwood, North Union township.
17. Outcrop on Cove Run at mouth of Chestnut Hollow, North Union township.
18. Outcrop on Black Creek, 1 mile south of Fairchance, Georges township.
19. Outcrop on main head fork of Redstone Creek, South Union township.
20. W. T. Bowers. Bowers mine, 1 mile north of Layton, Perry township.

CONEMAUGH COALS.

The correlation of the Conemaugh coals is most vague and this Survey will attempt none until detailed studies of the limestones and their faunas have established the real identity of the beds. In the absence of better designations, local names are used.

FARMINGTON COAL.

The Farmington coal, 65 feet above the Upper Freeport, is 3 feet thick at the town of Farmington in Wharton township. On Jonathan Run northeast of Youghiogheny River this bed averages 2 feet, and is even thicker in southern Wharton township where it carries several bone and clay partings. It has no commercial value at present.

HAGER COAL.

The Hager coal, lying about 180 feet above the Upper Freeport, has been mined in the vicinity of Hager Hill, where it is 3 feet thick. On Tharp Knob south of Youghiogheny River it is 5 to 7 feet thick, but contains several bone partings. It was once mined for local use on Redstone Creek.

BARTON COAL.

The Barton coal, which is about 115 feet above the Ames limestone, was mined years ago near Wharton Furnace in Wharton township, where it ranges from 18 inches to 4 feet thick. Elsewhere it is not minable and in some large areas is absent.

PITTSBURGH COAL.

The Pittsburgh coal in Fayette County is naturally divided geographically and can be conveniently discussed in two natural districts or basins, the Uniontown-Connellsville district and the Monongahela River district. Differences in quality and physical character of the coal are marked in the two districts.

The Pittsburgh coal in the Uniontown-Connellsville district ranges from 8 to 11 feet thick. It is unusually clean, and carries but one persistent bone binder varying from ¼ inch to 3 inches thick, about 18 inches from the bottom. In many places several bone partings, averaging less than ¼ inch, separate the benches in the lower division. The upper division is present, but is not as characteristic of the bed as in the river district. It is left on the roof to insure safety; sometimes a few inches of top coal from the lower division is also left for safety. The floor is remarkably uniform and free from rolls.

The coal has alternating dull resinous and bright shiny streaks, and contains numerous small lenses of bone, and some pyrite; it is compact, tends to break into cubes; is tender, and falls apart with handling. The latter character is not objectionable, as it is the best form for thorough coking. The Pittsburgh coal in the Connellsville basin is also used successfully as a steam coal.

North of Cheat River the bed is double, but its roof division is not minable, being composed of alternating layers of coal and clay.

The lower division is free from impurities with the exception of small lenses of bone coal and two thin binders that are sometimes present.

The chief difficulty in mining comes from a poor roof and occasional swells in the soft clay bottom.

The Connellsville coke region in Fayette County embraces an area 25 miles long by 2½ miles wide, containing 60 to 75 square miles. The Pittsburgh coal in this region has earned a reputation as the standard coking coal of the world.

The production of coke in this area began in 1859 with the successful trial of this fuel at the Pittsburgh furnace of Graff, Bennett and Company. In 1869 there were 70 beehive ovens in operation in the district.

The coke from this region has a silvery lustre, metallic ring, is cellular, tenaceous, comparatively free from impurities, and is capable of bearing a heavy burden in the furnace. Its hardness, well developed cell structure, purity, and uniform quality have given it a great reputation as a blast furnace coke. The average yield in coke is 65 per cent.

The Pittsburgh bed is primarily a gas coal in the river district although it is also used successfully as a steam and by-product coking coal.

The roof division is invariably present in this district, thickens to the north and is minable locally. It ranges from 1 to 7 feet thick and is composed of alternating layers of coal and clay.

The lower division commonly is 7 to 9 feet thick, and is almost always divided by thin bone partings into four benches, the breast, the bearing-in, the brick, and the lower bottom coal. The breast coal is the main part of the bed, averaging about 5 feet 6 inches thick. Bad roof conditions at times force operators to leave as much as 14 inches of this coal at the top to hold the roof. In some places the brick and lower bottom coal are impure and are left as a floor. In most mines the entire lower division is mined. The lower division thins northward to the Youghiogheny.

The lower division of the Pittsburgh bed averages about 9 feet thick in German, Menallen, Redstone, and Luzerne townships; in Nicholson and Brownsville townships the average is slightly lower. In the central part of Jefferson, the western part of Perry, and the southeastern part of Washington townships it averages about 8 feet 6 inches. In the western part of Jefferson and Washington townships, and in Lower Tyrone township the average thickness is 7 feet.

PITTSBURGH COAL IN THE CONNELLSVILLE DISTRICT.

Bullskin township. The Pittsburgh bed has been eroded in Bullskin township with the exception of a small area northwest of Mounts Creek in the vicinity of Moyer and Pennsville. In this area the entire bed averages 8 feet thick. The roof is draw slate and the bottom fire clay. The top bench, or breast coal, is 5 feet thick, and is separated from the bearing-in bench, 3 inches thick, by a ½-inch bone parting. The bearing-in bench is separated from the bottom bench, 3 feet thick, by a shale parting ½ to 1 inch thick. This area has been mined for many years and is now practically exhausted with the exception of pillars. The mines are drift and slope.

Upper Tyrone township. The Pittsburgh bed underlies practically all of Upper Tyrone township with the exception of where it has been eroded along Galley Run. In this township the coal averages 7 feet 10 inches thick, and has practically the same physical character as the Pittsburgh coal in Bullskin township with the exception that the bottom coal is thinner. This township has been the scene of mining activities for many years, and at the present time mines are working outcrop coal and areas which have been abandoned. When this area was first worked much coal was left in the ground and it is now possible to reopen the mines and recover this coal which was abandoned.

One company is operating a mine in the southern extremity of Upper Tyrone township, where the coal is 8 feet 4 inches thick. In this locality the upper bench is usually over 5 feet thick. The bearing-in bench is 2 to 3 inches thick, and the bottom bench 2 feet 10 inches to 3 feet thick.

Lower Tyrone township. The Pittsburgh coal is present only in the eastern part of Lower Tyrone township in the drainage area of Hickman Run. The coal has been practically worked out of this area and coked in beehive ovens. In some small areas the crop coal and pillar coal may be recovered in the future. The bed has the same physical character as in Upper Tyrone township.

Dunbar township. The Pittsburgh coal has an extensive outcrop along Youghiogheny River from Dickerson Run to Broadford. It again outcrops along the western flank of Chestnut Ridge anticline in the eastern part of Dunbar township. It is mined by drift and slope on its outcrop, but in the center of the basin in the western part of the township it is shafted to as much as 650 feet deep. This township was among the first to produce beehive oven coke. The Pittsburgh bed was used for this purpose and much of it has been depleted. Some large companies, however, have enough coal left to keep on mining for several years.

In the northern part of the township, along Youghiogheny River, the Pittsburgh bed ranges from 8 feet to 9 feet 4 inches thick. In this vicinity the coal rests directly upon the limestone below it. Locally a few inches of fire clay are present between the coal and the limestone. The roof is draw slate. The upper bench has an unusual thickness in the vicinity of Adelaide, often being as much as 6 feet thick. Its average is 5 feet. The usual bearing-in bench is present, 3 inches thick, and is separated from the top and bottom benches by shale partings ranging from ½ to 1 inch thick. The bottom bench ranges from 2 feet 10 inches to 3 feet thick.

South of Youghiogheny River on Dickerson Run the coal is thinner, averaging 8 feet. The coal has excellent quality and has been mined for many years. The top bench ranges from 4 feet 8 inches to 5 feet thick. The bearing-in bench is 2 to 3 inches thick, separated from the top and bottom benches by ½ to 1 inch shale partings. The bottom bench is 2 feet 11 inches thick.

In the northeastern part of the township, in the vicinity of Trotter and New Haven, the Pittsburgh bed averages 9 feet thick. The top bench ranges from 5 feet to 5 feet 6 inches thick. The bearing-in bench is 3 inches thick, and the bottom bench 3 feet thick. In the southeastern part of the township, in the vicinity of Dunbar and Ferguson, the Pittsburgh bed is practically exhausted although some companies have a reserve for a few years' mining. It has the same physical character as in the vicinity of Trotter.

In the vicinity of Leisenring, Monarch, and Juniataville, the coal averages 8 feet thick. The breast coal ranges from 4 feet 8 inches to 5 feet 2 inches thick. The bearing-in bench is 2 to 3 inches thick with 1-inch bone partings above and below it. The bottom bench is 3 feet thick.

Franklin township. The eastern part of this township lies in the Connellsville basin. The Fayette anticline, which extends through the center of the township, divides the river area from the Connellsville basin. The Pittsburgh coal outcrops just west of Elm Grove and at Mount Hope, its outcrop following the east bank of Bute Run. Some small isolated areas lie west of this run.

The Pittsburgh bed is being mined extensively in the vicinity of Buena Vista, where it averages 9 feet thick. The top bench has an unusual thickness of 6 feet. The bearing-in bench is locally absent and is replaced by a bone parting ½ to 1 inch thick. The bottom bench ranges from 2 feet 10 inches to 3 feet thick. These mining operations are in the hilltops and isolated from the main area of the Pittsburgh bed along Bute Run. On Bute Run the Pittsburgh bed averages 8 feet thick. The top bench is 5 feet thick, the bearing-in bench 2 to 4 inches thick with bearing-in partings ½ to 1 inch thick. The bottom bench ranges from 2 feet 8 inches to 3 feet thick.

North Union township. The Pittsburgh bed underlies all of North Union township west of the Pennsylvania Railroad, and from Lemont Furnace south to Coolspring and Hopwood. This township contains the main part of the Connellsville basin north of Uniontown. The coal is mined by drift along its eastern outcrop, but the majority of the mines are shafts and slopes, in some of which the coal is 650 feet deep. This township is in the heart of the Connellsville coking coal district. In the northwestern part of the township the Pittsburgh coal averages 8 feet 1 inch thick. The top bench ranges from 5 feet to 5 feet 2 inches thick. The bearing-in bench is locally absent and is replaced by a bone parting ½ inch thick. Where present, the bearing-in bench has a maximum thickness of 3 inches, and has partings, ½ inch thick, above and below it. The bottom bench ranges from 2 feet 10 inches to 3 feet thick.

West of Uniontown, in the vicinity of Oliver, the Pittsburgh coal averages 8 feet thick, and is locally 9 feet thick. The bed is regular with the exception of a few rolls on the bottom. The top bench averages 4 feet 7 inches thick. It locally contains two ¼-inch bone partings separated by 1½ inches of coal. The uppermost parting is usually about 2 feet 8 inches below the top. The usual bearing-in bench is present, 4 inches thick, and is separated from the top and bottom benches by shale partings ½ to 1½ inches thick. The bottom bench ranges from 2 feet 8 inches to 3 feet thick.

Along the National Highway, west of Uniontown, the bed is 9 feet thick. It has the same physical character as that at Oliver, but the top bench averages 5 feet 8 inches thick.

In the northeastern part of North Union township, in the vicinity of Mount Braddock, the Pittsburgh bed is also 9 feet thick. It has the usual physical character, and is very regular in thickness with the exception of one rock fault running in a northeast-southwest direction. This fault has a maximum width of 100 feet.

In the vicinity of Youngstown and Lemont Furnace the Pittsburgh bed averages 8 feet thick, but is locally 9 feet thick. There are no irregularities of deposition. The top bench ranges from 4 feet 8 inches to 5 feet 6 inches thick. It is usually in one bench, but is locally divided below the middle by a shale parting ½ inch thick. The characteristic bearing-in bench is present with its top and bottom partings. The bottom bench ranges from 2 feet 2 inches to 3 feet thick. It is underlain by clay 4 to 8 feet thick in which are boulders of iron ore. This iron ore was mined many years ago.

The Pittsburgh bed averages 8 feet 6 inches thick from Coolspring south to the National Highway. The top bench averages 5 feet thick, not including a bone coal parting ½ inch to 4 inches thick, about 4 feet below the top. The bearing-in bench is 4 inches thick, and its partings from ¼ to ½ inch thick. The bottom bench is 3 feet thick.

South Union township. This township is underlain by Pittsburgh coal as far east as Brownfield, where the coal outcrops on the western flank of Chestnut Ridge. The mines in this township are principally shafts and slopes. Most of them have been producing coal for a great many years and coal is hauled for many miles underground and hoisted up shafts.

In the northern part of the township, south of Uniontown, the Pittsburgh bed ranges from 7 feet 9 inches to 9 feet thick. On the National Highway the bed has its usual physical character, the top bench being 5 feet 7 inches thick, the bearing-in bench 4 inches, and the bottom bench 3 feet thick. On Coal Lick Run the top bench locally contains a bone parting ½ inch thick about 2 feet 4 inches from the top. The mines in this locality are old and their lifetime can be increased only by acquisition of virgin coal controlled by an estate.

In the southwestern part of the township, along Coal Lick Run and its tributaries, the Pittsburgh coal ranges from 8 feet to 8 feet 6 inches thick. The coal is mined by shafts 250 to 325 feet deep. The coal has the same physical character as it has in the vicinity of Uniontown. In some places the top bench is 5 feet thick; in others it is thicker, but contains a ½-inch bone parting about 3 feet below the top. The bearing-in bench is 4 inches thick with the usual partings above and below it. The bottom bench ranges from 1 foot 8 inches to 3 feet thick. Southwest of Uniontown, in the vicinity of Leith and on Benningtons Spring Run, the Pittsburgh bed averages 7 feet 6 inches thick. The top bench is 4 feet thick, the bearing-in bench 3 inches, and the bottom bench 3 feet 2 inches thick. The same physical character is persistent south of this point into the vicinity of Brownfield, but the coal increases in average thickness to 8 feet. The top bench is usually 4 feet 10 inches thick and clean, although locally a ½-inch shale parting is present 3 feet below the top. The bearing-in bench is 3 inches thick, and the bottom bench 3 feet thick.

Menallen township. A very small part of the Pittsburgh coal area in Menallen township is in the Connellsville basin. This area is one mile southeast of Balsinger. The coal averages 8 feet thick in the northern part of this area on Jennings Run. The top bench is 5 feet 7 inches thick and clean, the bearing-in bench is 4 inches thick, and the bottom bench 3 feet thick. Farther south the top bench is 4 feet 8 inches thick, and contains a few streaks of pyrite which cannot be separated from the coal. The bearing-in bench is 4 inches thick, and the bottom bench 3 feet thick.

Georges township. The southern end of the Connellsville basin is in Georges township. The Pittsburgh bed rises westward and outcrops in the vicinity of Highhouse. Its southern outcrop follows the West Branch of Yorks Run. The eastern outcrop is just west of Olyphant and Fairchance, and north of Smithfield. The Pittsburgh bed is contained in isolated areas in the hilltops along the southern township line.

In the northwestern part of the township on the North Branch of Browns Run, and in the vicinity of Highhouse, the Pittsburgh bed averages 8 feet thick. The top bench ranges from 4 feet to 4 feet 7 inches thick and is clean with the exception of a local shale parting ¼ inch thick approximately 12 inches below the top. The bearing-in bench is 3 to 4 inches thick with ½-inch bone partings above and below it. The bottom bench ranges from 3 feet to 3 feet 2 inches thick.

South of Highhouse on the headwaters of Yorks Run, and the South Branch of Browns Run, the Pittsburgh bed averages over 8 feet thick and ranges from 7 feet 4 inches to 9 feet 6 inches thick. The top bench ranges from 3 feet 10 inches to 4 feet 6 inches thick. The bearing-in bench is 4 inches thick and its partings ½-inch thick. The bottom bench ranges from 3 feet 2 inches to 3 feet 10 inches thick.

In the southwestern part of the township, along Yorks Run, the bed averages 9 feet 4 inches thick. The top bench is 4 feet 9 inches thick, the bearing-in bench 4 inches, and the bottom bench 3 feet 8 inches thick. On Yorks Run the roof coal of the Pittsburgh bed is sometimes of minable thickness although its quality is variable. This part of the bed is lost when the main division is mined beneath it.

The coal from the center of the basin, which is in the vicinity of Chadville, is removed through shafts on the east and west flanks of the syncline which forms the basin. The thicknesses of the coal as described on these flanks are characteristic of it in the center of the basin also.

The Pittsburgh coal is being mined by slope in the vicinity of Oliphant, where the bed averages 8 feet thick. This locality was the first wherein Pittsburgh coal was used for coking in Pennsylvania. The town of Oliphant bears the name of the founder of this industry. Although mining has been carried on in this part of the township for forty years, some Pittsburgh coal still remains, principally in pillars and crop coal. The areas of virgin coal are very small. In this vicinity the breast coal averages 4 feet 6 inches thick. The bearing-in bench is 4 inches thick with bone partings above and below it ranging from ¼ to ½ inch thick. The bottom bench ranges from 2 feet 6 inches to 3 feet thick.

The Pittsburgh coal thins in the vicinity of Fairchance and averages slightly less than 7 feet thick. The coal does not have persistent physical character in this local area, the top bench being split into three divisions by two shale partings, the upper 1 inch thick, and the lower ½ inch thick. The usual bearing-in bench, 4 inches thick, is present. The bottom bench is 3 feet thick.

The Pittsburgh coal averages 6 feet 8 inches thick between Fairchance and the southern Georges township line, including the area at Smithfield. The top bench ranges from 3 to 6 feet thick, and is locally separated into two minor benches by a ½-inch shale parting, 6 inches from the top. The bearing-in bench is 3 to 5 inches thick with bone partings above and below it, ranging from ½ to 1½ inches thick. The bottom bench ranges from 2 feet to 3 feet 6 inches thick.

Springhill township. The Pittsburgh coal occurs in the highlands of Springhill township east of Monongahela River and west of Grassy Run. These outlying areas are the southern extension of the Connellsville basin. The mines in this township are smaller than those in the main part of the Connellsville basin, and mining has been carried on for a great many years. An appreciable quantity of coal still remains.

In the vicinity of Outcrop the Pittsburgh bed averages 6 feet 3 inches thick. The usual draw slate is not present and the coal is overlain by bone coal which is left up as roof. This is burnt to the coal and hard to separate. The bed varies much in physical character. The bearing-in bench has lost its identity in most of the mines and a bone coal parting, usually 3 to 4 inches thick, has taken its place. The top bench rarely occurs without one or more partings of bone coal. It ranges from 3 to 4 feet thick. The lower bench is also variable in thickness, ranging from 17 inches to 4 feet 7 inches thick. Locally it contains numerous pyrite nodules and lenses of bone.

In the vicinity of Gans the Pittsburgh bed averages slightly less than 6 feet thick. It is under thin cover and the coal is somewhat leached, particularly near the outcrop. The roof is bone coal and shale. The usual three divisions of the Pittsburgh bed can not be identified in this locality. Three shale partings occur at variable positions in the bed which make the benches of coal vary in their thickness. In one mine 2 feet 2 inches of the top of the bed is alternating bands of coal and bone. A bench of pure coal, 4 feet 8 inches thick, underlies these alternating bands. In another mine the coal occurs in three benches, the top 14 inches thick, the middle 2 feet 2 inches, and the bottom 2 feet thick. The top and middle benches are good clean coal, but the bottom bench contains some pyrite nodules.

On Grassy Run, northeast of Cheathaven, the Pittsburgh bed ranges from 6 to 7 feet thick, increasing in thickness southward.

In this area there has been much irregularity in deposition. Clay beds cut the coal and binders thicken up and replace coal in large areas. Rock faults, probably the refilling of old stream channels, cut the bed at numerous localities. There is no definite physical character to be found. The coal benches vary in thickness within a few feet. Usually there are four bone and shale partings ranging from 1 to 3 inches thick, which separate the coal into three benches varying in thickness.

On Cheat River, in the vicinity of Cheathaven, the coal is 6 feet thick. The variability in physical character extends into this locality. Usually there are only two partings in the bed; the upper one is the thickest and ranges from 4 to 12 inches. The two lower partings are extremely variable, both in thickness and position.

Along Cheat River, between Cheathaven and Point Marion, the Pittsburgh bed ranges from 5 feet 6 inches to 6 feet 6 inches. The coal is regular in thickness in some mines, but in others it thickens and thins because of a rolly bottom. Some mines have been much troubled by driving into sandstone faults. The bed is usually separated into three or four benches by shale and bone coal partings usually less than 2 inches thick. The bottom bench is the thickest, ranging from 2 feet 6 inches to 4 feet 3 inches thick. It is never entirely clean, and contains numerous streaks of bone coal and pyrite.

In the vicinity of Point Marion the Pittsburgh bed thickens to an average of 6 feet 6 inches. Numerous rock faults make mining rather hazardous. In this locality the partings in the bed are again variable in position and thickness. The bed is usually separated into four benches by bone and shale partings 1 to 5 inches thick. The thickest bench is on the bottom, but even it contains pyrite nodules and knife blades of bone.

East of Monongahela River and north of Point Marion the bed thickens to 6 feet 10 inches. Rock rolls and other deposition irregularities are not encountered, but the coal contains numerous shale partings $\frac{1}{4}$ to $\frac{1}{2}$ inch thick. The bed usually occurs in five benches. The top bench ranges from $11\frac{1}{2}$ inches to 3 feet 4 inches thick. The benches in the middle part of the bed range from 4 to 18 inches thick. The bottom bench ranges from 13½ inches to 3 feet 10 inches thick.

Nicholson township. The area of Pittsburgh coal in Nicholson township is composed of isolated patches on the hilltops, and in the highlands east of Cats Creek. Jacobs Creek has eroded the Pittsburgh coal and makes a convenient dividing line between the River and the Connellsville district. Only the coal lying east of Jacobs Creek will be discussed under the Connellsville district.

In an area in the northern part of the township, with Woodside as its center, the Pittsburgh coal averages 8 feet 2 inches thick. The top bench ranges from 3 feet 5 inches to 4 feet 7 inches thick. The bearing-in bench is 4 inches thick with shale partings ¼ to ½ inch thick above and below it. The bottom coal ranges from 3 feet 3 inches to 3 feet 6 inches thick. Draw slate overlies the bed, and the bottom is fire clay.

In the eastern part of the township, in the vicinity of Old Frame, the coal is 8 feet thick. Locally it preserves its usual physical character, but generally it contains one or more extra partings of bone. Where the upper bench is without a parting it is usually 3 feet 4 inches to 4 feet 2 inches thick, and the bottom coal is 3 feet 6 inches thick. Locally a binder is present near the center of both the upper and bottom benches. These partings range from ½ to 1 inch thick. In extremely local areas the bed is separated into as many as six benches by shale partings ¼ inch thick at various intervals in the bed.

Along Monongahela River from the mouth of Jacobs Creek to New Geneva the Pittsburgh coal is 7 feet 9 inches thick. The coal varies much in physical character, and is somewhat disturbed by rock faults and clay veins. Locally the coal occurs in three benches, which is characteristic of the Pittsburgh bed, but generally there are four or five benches separated by shale partings ¼ to ½ inch thick. Each bench varies in thickness. The lower bench is thickest, and ranges from 3 feet 3 inches to 3 feet 10 inches.

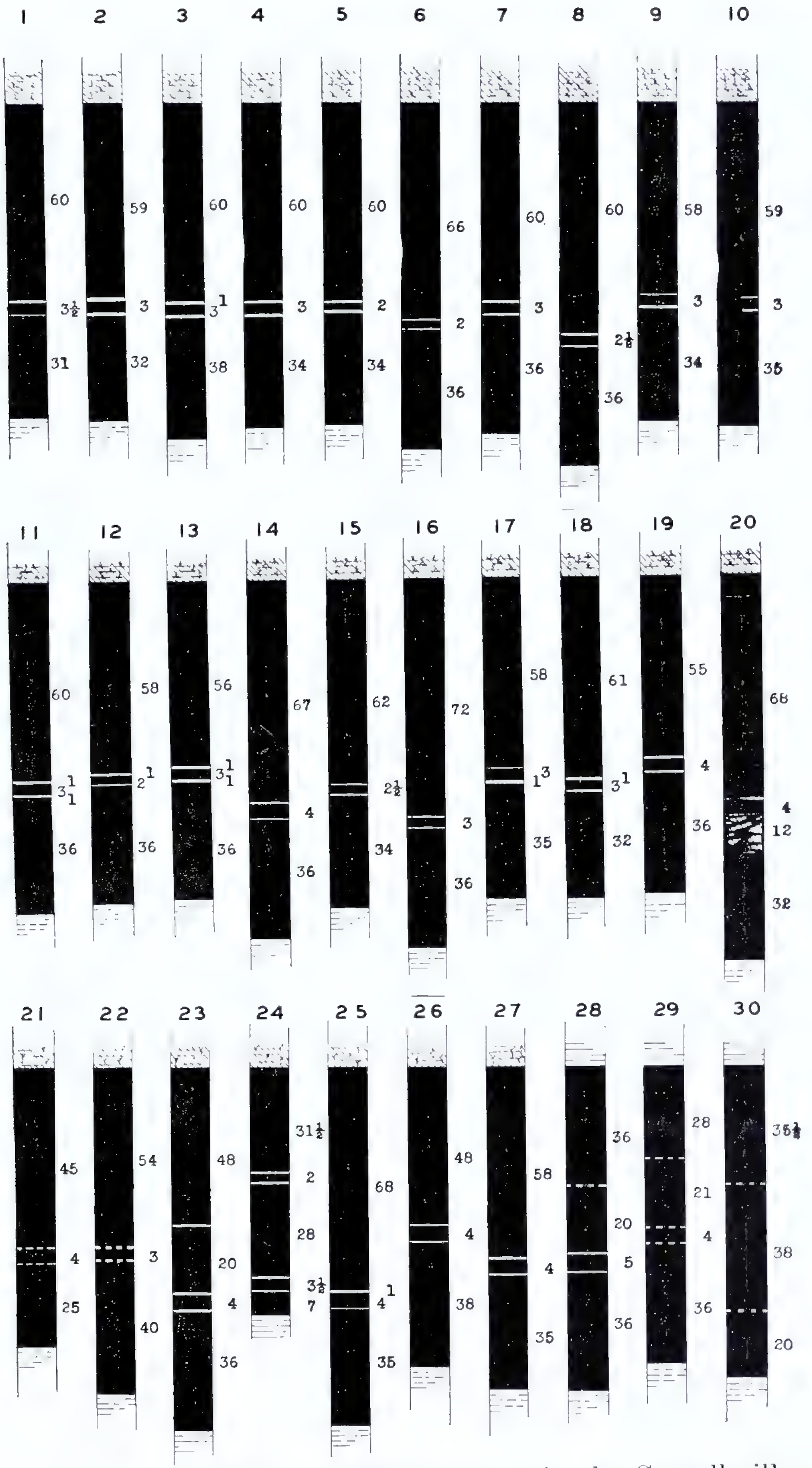


Figure 80. Sections of Pittsburgh coal in the Connellsville District, Fayette County.

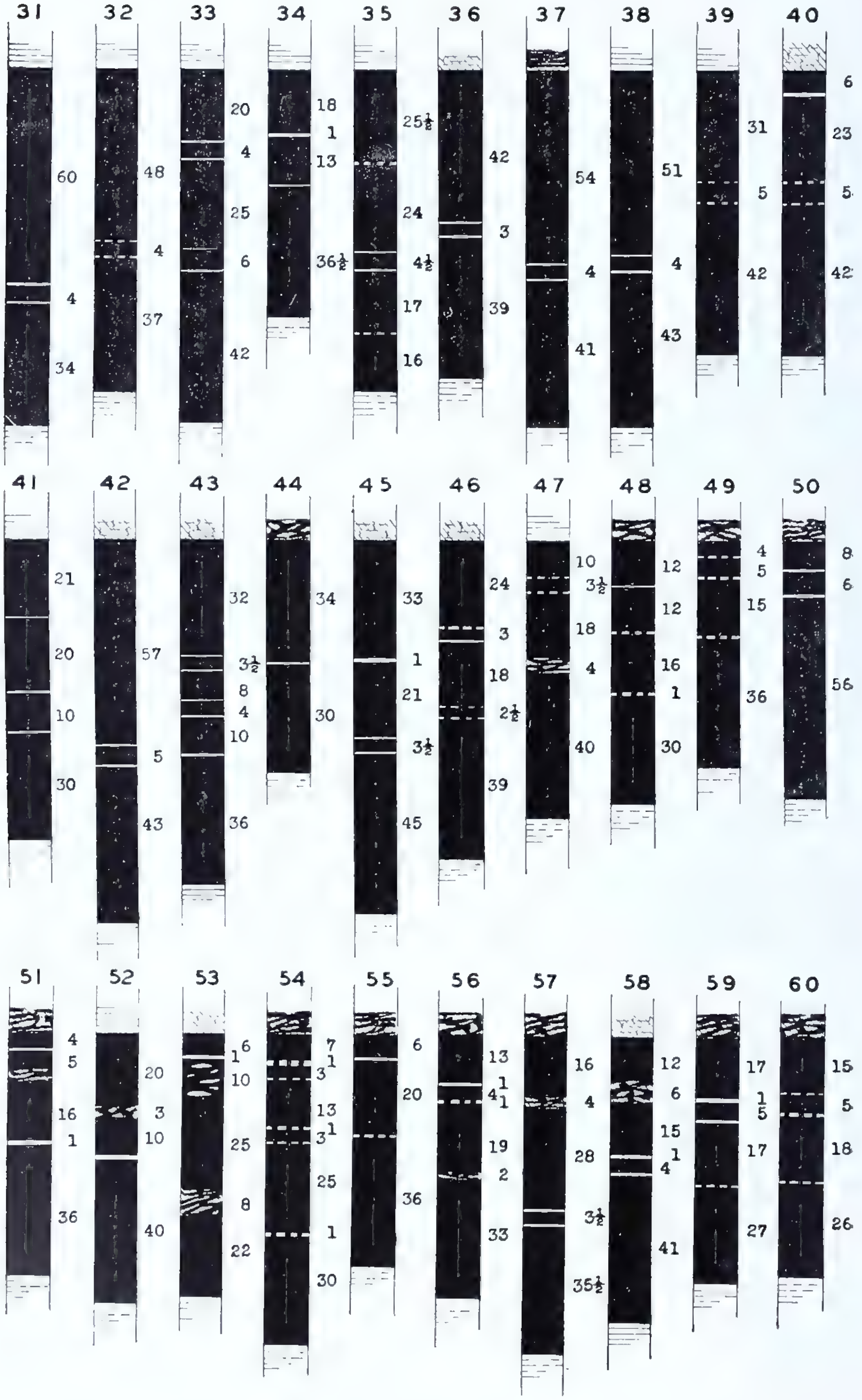


Figure 81. Sections of Pittsburgh coal in the Connellsville District, Fayette County.

1. Connellsville Coke Company. Dexter No. 2 mine, 1½ miles east of Scottdale, Upper Tyrone township.
2. Summit Connellsville Coal & Coke Company. Franklin mine, 1¾ miles southwest of Scottdale, near Tintsman, Upper Tyrone township.

3. Central Fuel Company. Lawyer mine (abandoned), on Irish Run, at Pennsville. Bullskin township.
4. W. J. Rainey, Inc. Grace mine (abandoned), 2 miles northeast of Connellsville, near Moyer, Bullskin township.
5. H. C. Frick Coke Company. Davidson mine, at Davidson, ¾ mile northwest of Connellsville, Connellsville township.
6. Blackstone Coal Company. Blackstone mine, in West Connellsville, Dunbar township.
7. H. C. Frick Coke Company. Trotter mine, at New Haven, 1½ miles west of Connellsville, Dunbar township.
8. H. C. Frick Coke Company. Adelaide mine, at Adelaide, 1½ miles southeast of Dawson, Dunbar township.
9. J. H. Dunn. Liberty mine, at East Liberty, opposite Dawson, Dunbar township.
10. Nellie Coal & Coke Company. Nellie mine, 1 mile southwest of Vanderbilt, Dunbar township.
11. H. C. Frick Coke Company. Leisenring No. 1 mine, at Leisenring, Dunbar township.
12. H. C. Frick Coke Company. Juniata mine, at Juniataville, Dunbar township.
13. H. C. Frick Coke Company. Leisenring No. 3 mine, at Monarch, Dunbar township.
14. Connellsville Coal & Coke Company. Ferguson mine, ¼ mile northwest of Ferguson and 1½ miles southwest of Dunbar, Dunbar township.
15. H. C. Frick Coke Company. Leisenring No. 3 mine, at West Leisenring, Dunbar township.
16. Vanderbilt Coal & Coke Company. Butte No. 1 mine, at Buena Vista, Franklin township.
17. W. J. Rainey, Inc. Elm Grove mine, at Elm Grove, Franklin township.
18. Thornbottom Coal Company. Work mine (abandoned), on Bute Run near Laurel Hill, Franklin township.
19. Davis Coal & Coke Company. Browning mine (abandoned), on Bute Run, near Mount Hope, Franklin township.
20. W. J. Rainey, Inc. Mt. Braddock mine, at Mt. Braddock, North Union township.
21. H. C. Frick Coke Company. Youngstown mine, at Youngstown, North Union township.
22. H. C. Frick Coke Company. Lemont No. 2 south slope at Lemont Furnace, 2½ miles northeast of Uniontown, North Union township.
23. Beeson Coal Company. Stewart No. 1 mine, near Coolspring, 2 miles east of Uniontown, North Union township.
24. Oliver & Snyder Steel Company. Oliver No. 1 mine, at Oliver, North Union township.
25. Stern Coal Company. Ball mine, on National Highway, 1 mile northwest of Uniontown. North Union township.
26. H. C. Frick Coke Company. Leith shaft, at Leith, 1 mile south of Uniontown. South Union township.
27. Seeler Coal Company. Margaret mine, on Benningtons Spring Run, 1 mile west of Hopwood, South Union township.
28. H. C. Frick Coke Company. Redstone mine, at Brownfield, 3 miles south of Uniontown, South Union township.
29. H. C. Frick Coke Company. Continental No. 1 mine, on Coal Lick Run, ¼ mile southwest of Uniontown, South Union township.
30. South Union Coal Company. South Union mine, on west branch of Coal Lick Run, 1¾ miles southwest of Uniontown, South Union township.
31. H. C. Frick Coke Company. Continental No. 2 mine, on Coal Lick Run, near Georges township line, 2½ miles southwest of Uniontown.
32. Hayden Coal Company. Hayden mine, near Highhouse, 5 miles southwest of Uniontown, Georges township.
33. H. C. Frick Company. Oliphant mine, at Oliphant, Georges township.
34. H. C. Frick Coke Company. Kyle mine, 1 mile north of Fairchance, Georges township.
35. B. F. Martin, country bank, 1 mile southwest of Fairchance, Georges township.
36. Morris Connellsville Fuel Company. Dewberry mine, on left bank of George Creek, 1 mile northeast of Smithfield, Georges township.
37. H. C. Frick Coke Company. Shoop No. 1 mine, 6 miles southwest of Uniontown and 2 miles southeast of Highhouse, Georges township.
38. H. C. Frick Coke Company. Shoop No. 2 mine, on a west branch of Yorks Run, 3 miles northwest of Smithfield, Georges township.
39. Russell Coal & Coke Company. Russell mine, at Smithfield, Georges township.
40. Fairchance Coal & Coke Company. Blue Rock No. 2 mine, on headwaters of Croziers Run, 1 mile northeast of Woodside. Georges township.
41. Republic Iron & Steel Company. Bowood No. 3 mine, on Croziers Run, near Woodside, and 2½ miles northwest of Smithfield, Nicholson township.
42. Gilmore Coke Company. Gilmore No. 2 mine, on Croziers Run, 1¾ miles north of Smithfield, Nicholson township.
43. Byme Coal Company. Eddie mine, at Stum Station, 2 miles west of Smithfield, Nicholson township.

44. Reilley Callaghan Coal & Coke Company. Baxter Ridge mine, on Morgantown road between Smithfield & Morris Cross Roads, Nicholson township.
45. Republic Iron & Steel Company. Martin mine, on Monongahela River at the mouth of Jacobs Creek, Nicholson township.
46. New Geneva Fuel Company. Powell mine, ½ mile northeast of New Geneva, Nicholson township.
47. Clark Coal Company. Foster mine, on Georges Creek, 1 mile northwest of outcrop, Springhill township.
48. Rich Hill Coal Company. Rich Hill mine, at outcrop, Springhill township.
49. Morgan Coal & Coke Company. Cornish mine, on B. & O. Railroad, 1 mile south of Outcrop, Springhill township.
50. Lyons Coal Company. Lynn mine, at Gans Station, on B. & O. Railroad, Springhill township.
51. Hertzog Coal & Coke Company. Hertzog mine, on Grassy Run, 1 mile northeast of Cheat Haven, Springhill township.
52. Westmoreland-Fayette Coal & Coke Company. Ada mine, at Cheat Haven, Springhill township.
53. Southern Connellsville Coke Company. Marion mine, on south slope of Cheat River, ½ mile west of Cheat Haven, Springhill township.
54. Fancy Hill Coal Company. Eagle mine, 1¼ miles northwest of Cheat Haven on north slope of Cheat River, Springhill township.
55. Davidson-Connellsville Coal & Coke Company. Frederick No. 1 mine, on south slope of Cheat River, 1 mile southeast of Point Marion.
56. Locust Hill Coal Company. Locust Hill mine, 1 mile northwest of Point Marion, Springhill township.
57. American Manganese Manufacturing Company. Marshall mine, on tram road 1½ miles northwest of Point Marion, Springhill township.
58. Atlantic Coal Company, Inc. Atlantic No. 1 mine, 1½ miles northwest of Point Marion, opposite Dilliner, Springhill township.
59. Winstead Coal Company. Winstead mine, 2 miles northwest of Point Marion, and 1 mile southeast of Lock No. 8, Springhill township.
60. Atlantic Coal Company, Inc. Atlantic No. 1 (Willa) mine, on Georges Creek, 1½ miles southeast of New Geneva, Springhill township.

PITTSBURGH COAL IN THE RIVER DISTRICT.

The Fayette anticline conveniently separates the coals of Fayette County into two districts, one of which has been discussed as the Connellsville basin. The river district comprises the townships bordering on Monongahela River, and also includes Perry, Franklin, and Redstone townships. The Pittsburgh bed in this district is primarily a gas coal, but is being used at present with great success in by-product ovens.

Washington township. In the vicinity of Belle Vernon, and along Monongahela River south to Fayette City, the Pittsburgh bed ranges from 7 feet to 7 feet 6 inches thick. The coal is overlain by a draw slate 12 inches thick. The top bench, or breast coal, ranges from 4 feet 4 inches to 4 feet 8 inches thick. The bearing-in bench is 3 inches thick with top and bottom partings ½ inch thick. The bottom coal ranges from 2 feet 4 inches to 2 feet 8 inches thick. In the vicinity of Arnold City the coal is thinner, averaging approximately 7 feet. The draw slate above the coal is 8 to 11 inches thick. The top bench ranges from 4 feet 2 inches to 4 feet 4 inches thick. The bearing-in bench ranges from 3 to 5 inches thick with ½ inch bone partings above and below it. The bottom bench ranges from 2 feet 2 inches to 2 feet 8 inches thick. A roof coal, 8 to 14 inches thick, is present directly above the draw slate. The coal is not mined.

South of Fayette City, and east of Monongahela River, the Pittsburgh bed is extensively mined and averages 7 feet 8 inches thick.

The draw slate above the bed ranges from 10 to 12 inches thick. Above it is a roof of coal 10 inches thick. The top bench ranges from 4 feet 8 inches to 5 feet 4 inches thick. The bearing-in bench is 2 to 3 inches thick with the usual partings above and below it. The bottom bench ranges from 2 feet 4 inches to 2 feet 8 inches thick. The bottom is invariably fire clay.

Perry township. The Pittsburgh bed is mined by slopes and shafts in this township as it does not outcrop. The entire bed averages 8 feet thick, and sometimes is much thicker. The breast coal ranges from 5 feet 1 inch to 5 feet 8 inches thick. Locally a bone coal parting, ¼ inch thick, is present in the breast coal approximately 2 feet 9 inches below the top. The breast coal ranges from 3 to 4½ inches thick. The bone bands above and below it are ¼ to ½ inch thick. The bottom coal ranges from 2 feet 3 inches to 2 feet 10 inches thick. The only irregularities in deposition are clay veins and a few sandstone rolls on the bottom.

Jefferson township. The Pittsburgh bed outcrops only in a limited area along Monongahela River in this township. It comes to the surface at a few points on Redstone Creek.

In the northern part of the township, in the vicinity of Troytown, and on Little Redstone Creek, the Pittsburgh bed averages 8 feet thick. A roof coal, 10 to 16 inches thick, is present above the draw slate. The breast coal ranges from 4 feet 6 inches to 6 feet 2 inches thick. The bearing-in bench is 3 inches thick with ½-inch shale partings above and below it. The bottom coal ranges from 2 feet 6 inches to 2 feet 8 inches thick.

Along Monongahela River, opposite California, the Pittsburgh coal is 8 feet thick. A draw slate, 12 inches thick, with a roof coal 6 inches thick above it, makes a good roof. The draw slate is underlain by a sulphur band ½ to 1 inch thick. The top bench has a total thickness of 5 feet 1 inch including an additional sulphur band approximately 2 inches from the bottom. The bearing-in bench is 2 inches thick with shale partings, ½ inch thick, above and below it. The bottom bench is 2 feet 6 inches thick.

The Pittsburgh coal is mined extensively on Redstone Creek in the southern part of Jefferson township. The mines are large and coal is hauled for many miles underground in these mines. The coal ranges from 7 feet 6 inches to 8 feet 2 inches thick. There are no irregularities with the exception of local rolls on the floor. The breast coal ranges from 5 feet 2 inches to 5 feet 8 inches thick. The bearing-in bench is 2 inches thick with shale bands above and below it ½ inch thick. The lower bench is 2 feet 4 inches to 2 feet 8 inches thick.

Franklin township. The area of the Pittsburgh coal in the river district of Franklin township lies west of Allen Run. Crabapple Run is near the middle of it. The Pittsburgh coal in this area averages 8 feet thick. It has a maximum thickness of 8 feet 10 inches. The top bench ranges from 5 feet 2 inches to 5 feet 6 inches thick. The bearing-in bench is 2 to 3 inches thick with the usual shale bands above and below it. The bottom bench is 2 feet 9 inches to 2 feet 11 inches thick.

Brownsville township and Bridgeport Boro. The Pittsburgh bed ranges from 7 feet to 8 feet 6 inches thick in this area. The breast coal is 4 feet to 5 feet 6 inches thick. The bearing-in bench is 2 inches thick with bone partings above and below it, $\frac{1}{2}$ inch thick. The bottom bench is 2 feet 3 inches to 2 feet 10 inches thick. It often contains two non-persistent shale partings $\frac{1}{8}$ inch thick.

Redstone township. The Pittsburgh bed underlies all of Redstone township. It outcrops only on the eastern tributaries of Monongahela River. On Redstone Creek the Pittsburgh bed averages 8 feet thick. It is mined by drifts, slopes, and shafts. The bed is overlain by 12 inches of draw slate, above which is a bench of roof coal 5 inches to 1 foot 8 inches thick. The top bench of the main division ranges from 4 feet 6 inches to 5 feet 6 inches thick. The bearing-in bench is 2 to 3 inches thick with $\frac{1}{2}$-inch bone partings above and below it. The bottom coal ranges from 2 feet 7 inches to 3 feet thick. The bottom is fire clay and is rolly in a few localities.

In the eastern part of Redstone township the Pittsburgh coal averages 7 feet 7 inches thick. It is mined by shafts from 350 to 650 feet deep. The top bench, or breast coal, ranges from 3 feet 10 inches to 5 feet 9 inches thick. The bearing-in bench is 2 inches thick with $\frac{1}{4}$-inch partings above and below it. The bottom bench ranges from 2 feet 11 inches to 3 feet 9 inches thick. Locally the bearing-in bench is not present and is replaced by a shale parting $\frac{1}{4}$ inch thick. In these localities the bottom bench is 3 feet 10 inches thick.

The Pittsburgh coal is mined extensively by shafts and slopes on Dunlap Creek in Redstone township. The coal ranges from 7 to 9 feet thick, averaging approximately 8 feet. The usual physical character of the Pittsburgh coal is prevalent with the exception that the bearing-in bench is lacking and is replaced by a bone parting $\frac{1}{2}$ inch thick. Locally the bed is divided into three or more benches by bone coal partings $\frac{1}{8}$ to $\frac{1}{4}$ inch thick. This character is most prevalent on Saltlick Run. In one locality north of Merrittstown the Pittsburgh coal is 7 feet 6 inches thick and has no binders or partings.

Luzerne township. The Pittsburgh coal underlies all of Luzerne township. It is mined principally by shafts and slopes. In the area of Dunlap Creek the Pittsburgh has the same characteristic as is described under Redstone township. Just west of Dunlap Creek the Pittsburgh coal ranges from 7 feet 4 inches to 7 feet 6 inches thick. In most localities the bearing-in bench is absent and the coal occurs in two or three benches separated by ½-inch bone partings. Locally the bottom part of the lower bench is impure due to the presence of three of four thin bone partings. This coal is generally left in the mine.

In the northern part of Luzerne township the Pittsburgh bed ranges from 8 feet to 8 feet 9 inches thick. The top bench ranges from 4 feet 5 inches to 6 feet thick. The bearing-in bench is 4 inches thick with ¼ to ½ inch bone partings above and below it. The bottom bench is 3 feet thick.

In the western part of Luzerne township in the big bend of Monongahela River the Pittsburgh bed thins and averages 6 feet 3 inches thick. The top bench ranges from 2 feet 10 inches to 4 feet 3 inches thick. The bearing-in bench is not present but a binder, 1 to 2 inches thick, underlies the top bench. The top bench also locally contains a 1½ inch bone binder 11 inches from the top. The bottom bench ranges from 3 feet to 3 feet 4 inches thick. Five inches of the bottom of this bench is impure bony coal and is not mined.

Along Monongahela River, south of Arensburg Ferry, the Pittsburgh bed averages 7 feet 3 inches thick. The top bench ranges from 2 feet 3 inches to 4 feet thick. The characteristic bearing-in bench is present at most localities and separates the bottom bench, 4 feet thick, from the top bench. Locally the bearing-in bench is absent and a 1-inch shale parting separates these benches.

Menallen township. The Pittsburgh bed outcrops near Footedale and one mile west of Haddenville in Menallen township. The bed dips west into the Lambert syncline. North of the National Highway the Pittsburgh coal averages 9 feet thick. The top bench ranges from 5 feet to 5 feet 9 inches thick. In some localities it is split about 3 feet from the top by a black bone coal parting 1 inch thick. The bearing-in bench is 3 to 4 inches thick, and its partings ¼ to ½ inch thick. The bottom bench ranges from 2 feet 9 inches to 3 feet thick.

South of the National Highway the bed thins to an average of 7 feet 8 inches. The top bench is usually approximately 5 feet thick, and is separated from the bottom bench by a shale parting ½ to 1 inch thick. The bottom bench ranges from 2 feet 8 inches to 4 feet thick.

German township. The Pittsburgh coal is deep under cover in the western part of the township but outcrops on a northeast-southwest line from Masontown north through Ache Junction to Footedale. In the vicinity of Footedale the Pittsburgh bed is 8 feet 5 inches thick. The top bench is usually 4 feet 9 inches thick. The bearing-in bench is 4 inches thick with partings above and below it $\frac{1}{4}$ inch thick. The bottom bench is 2 feet 10 inches thick.

In the vicinity of Dearth and Lambert the Pittsburgh coal averages slightly under 8 feet thick. It is mined by shaft. The top bench averages 4 feet 5 inches thick. The bearing-in bench ranges from $2\frac{1}{4}$ to $3\frac{1}{2}$ inches thick with bone partings, $\frac{1}{4}$ to $\frac{3}{8}$ inch thick, above and below. The bottom bench is usually 2 feet 9 inches thick.

Along Monongahela River and its eastern tributaries between Antram and Browns runs the Pittsburgh coal averages 8 feet thick. In the vicinity of Gates the top bench is 4 feet 9 inches thick. The bearing-in bench is 4 inches thick with $\frac{1}{4}$ inch bone partings above and below it. The bottom bench is usually 3 feet 4 inches thick. Locally a 1-inch shale parting is present 6 inches above the bottom. The top bench is also locally split near the middle by a $\frac{1}{8}$-inch bone parting.

North of Huron the coal is split into three to five benches by shale and bone partings $\frac{1}{4}$ inch to $2\frac{1}{2}$ inches thick. Locally there is 1 foot 11 inches of bone coal at the bottom of the bed. South of Huron the bed regularly occurs in four benches. The top bench averages 4 feet 9 inches thick, and the bearing-in bench, 5 inches thick, with partings $\frac{1}{2}$ inch thick above and below it. The bottom bench, averaging 3 feet 3 inches thick, contains a shale parting $\frac{1}{4}$ inch thick near the top.

In the vicinity of Edenborn the Pittsburgh coal is 8 feet 7 inches thick. The top bench is 5 feet 11 inches thick, the bearing-in bench $3\frac{1}{2}$ inches thick, and the bottom bench 2 feet 10 inches to 3 feet 4 inches thick. Two branches of a sandstone replacement, which extend from Gates mine, are present in this vicinity, but they have thinned.

Along the North Branch of Browns Run the Pittsburgh coal averages 8 feet 6 inches thick. Many mines are open in this vicinity. They are drifts, rock slopes, and strippings. The coal does not vary much in physical character. The top bench ranges from 4 feet to 5 feet 3 inches thick. This bench locally contains a $\frac{1}{4}$-inch shale parting about 2 inches below the top. The bearing-in bench averages 3 inches thick and has $\frac{1}{4}$ to $\frac{1}{2}$ inch bone partings above and below it. In some mines this bench is absent, a $\frac{1}{2}$-inch bone parting taking its place. The bottom bench ranges from 3 feet to 3 feet 8 inches thick. This bench also locally contains a bone parting at various positions in it.

On the South Branch of Browns Run the Pittsburgh bed averages 8 feet thick. The top bench ranges from 3 feet 7 inches to 3 feet 10 inches thick. The bearing-in bench ranges from 3 to 6 inches thick. The bearing-in partings are ½ inch thick. The bottom bench ranges from 3 feet to 3 feet 10 inches thick. In this vicinity four benches of roof coal overlie the draw slate but this coal is of inferior quality and can not be mined profitably.

In the vicinity of Masontown, and on Cats Creek, the Pittsburgh coal averages 8 feet 4 inches thick. The top bench ranges from 4 feet 3 inches to 5 feet thick. The bearing-in bench is 3 to 4 inches thick with partings above and below it, ¼ inch thick. The bottom bench ranges from 1 foot 8 inches to 3 feet 7 inches thick. Locally the top bench contains three ¼-inch partings separated by 4 to 6 inches of coal. On Monongahela River west of Masontown the Pittsburgh bed ranges from 8 feet to 8 feet 6 inches thick. The top bench ranges from 4 feet 7 inches to 4 feet 11 inches thick. The bearing-in bench is 4 inches thick with bone partings, ¼ to ½ inch thick, above and below it. The bottom bench ranges from 2 feet 11 inches to 3 feet 5 inches thick.

Nicholson township. The only area of Pittsburgh coal in Nicholson township included in the river district lies between Jacobs and Cats creeks. In the northeastern part of this area the Pittsburgh bed is persistently 8 feet thick. The top bench ranges from 4 feet 3 inches to 4 feet 8 inches thick. The bearing-in bench is 4 inches thick with a shale parting, ¼ to ½ inch thick, above and below it. The bottom coal is 3 feet 5 inches thick.

Between Grays Landing and Jacobs Creek on Monongahela River the Pittsburgh bed averages 8 feet thick and usually has its characteristic physical character, although locally two or more additional shale or bone partings appear and split the bed into three to five benches. These partings are generally less than 1 inch thick and are readily removed from the coal.

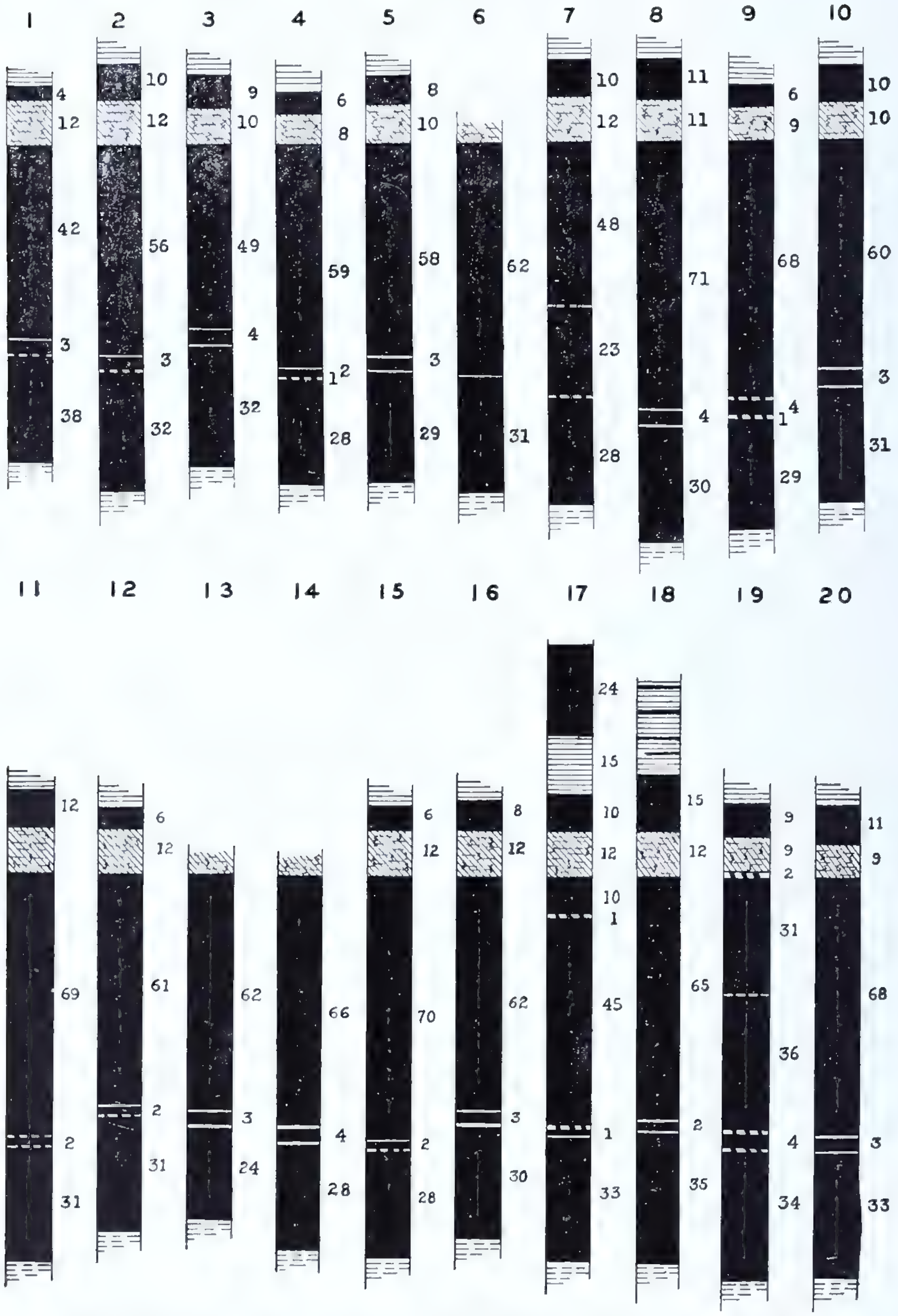


Figure 82. Sections of Pittsburgh coal in the River District, Fayette County.

1. S. M. Speers. Speers mine, on Goulds Run in borough of Belle Vernon.
2. Pittsburgh Coal Company. Tremont mine, on east bluff of Monongahela River, 1¼ miles southeast of Belle Vernon, Washington township.
3. Hillman Coal & Coke Company. Naomi mine, at Arnold City, Washington township.
4. Pittsburgh Coal Company. Fayette City mine, on east bank of Monongahela River, ¼ mile south of Fayette City, Washington township.
5. L. A. Brown. Brown mine, on Little Redstone Creek, near Gillespie, Washington township.
6. Pittsburgh Coal Company. Banning No. 2 mine, on west bank of Youghiogheny River at Whitsett Junction on P. & L. E. Railroad, Perry township.

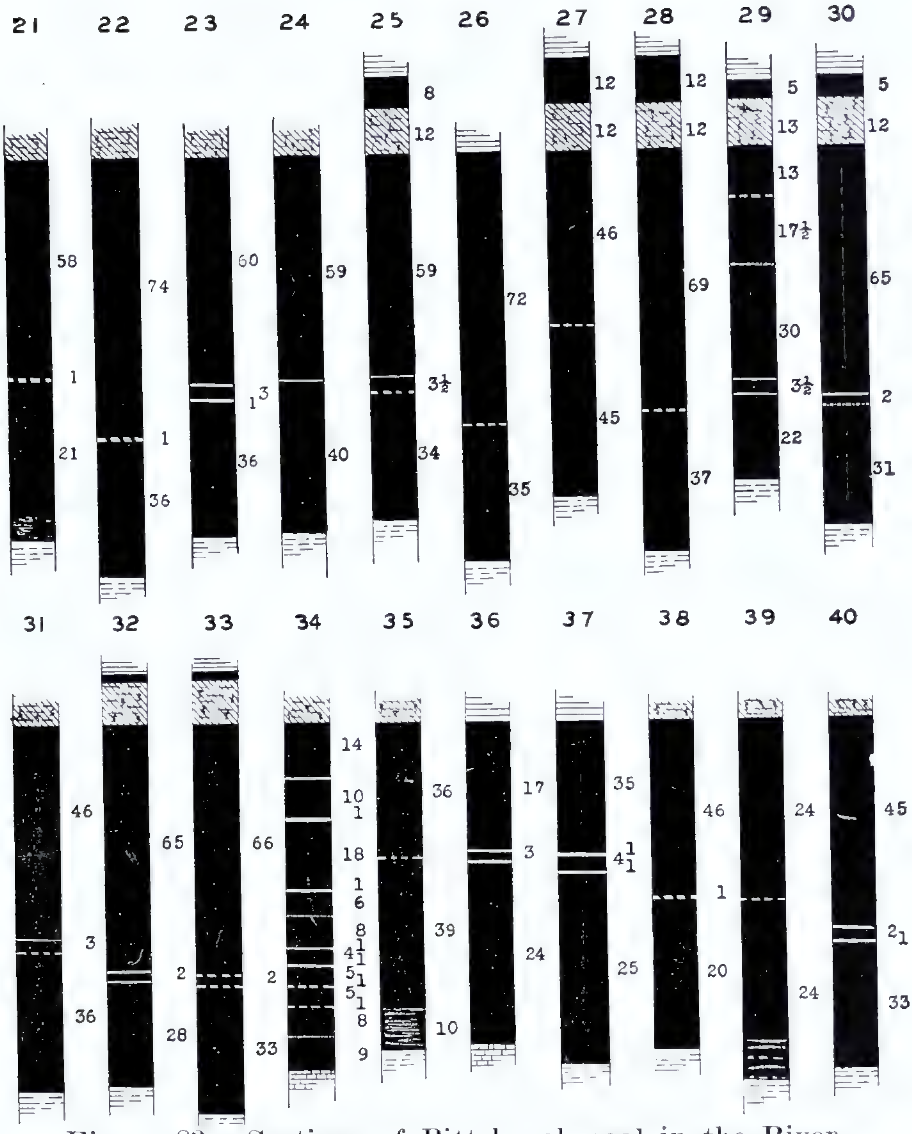


Figure 83. Sections of Pittsburgh coal in the River District, Fayette County.

7. Jamison Coal & Coke Company. Jamison No. 22 mine, near Lynn, ¾ mile northwest of Perryopolis, Perry township.
8. Jamison Coal & Coke Company. Jamison No. 21 mine, ¾ mile southwest of Perryopolis, on Washington Run, Perry township.
9. Washington Coal & Coke Company. Washington No. 1 mine, in Stickel Hollow, at Star Junction, Perry township.
10. H. C. Frick Coke Company. Colonial Dock mine, at Troytown, poposite Stockdale, on Monongahela River, Jefferson township.
11. Lowber Gas Coal Company. Fayette mine, on Little Redstone Creek, 1 mile east of Kenneth, Jefferson township.
12. Chamouni Coal Company. Chamouni mine, on east bank of Monongahela River at Chamouni, 1 mile southeast of California, Jefferson township.
13. Forsythe Coal Company. Albany mine, on east bank of Monongahela River, near Albany, 1 mile north of Brownsville, Jefferson township.
14. Pittsburgh & Erie Coal Company. Sumner No. 2 mine, at Braznell on Redstone Creek, 1½ miles northeast of Brownsville, Jefferson township.
15. H. C. Frick Coke Company. Colonial No. 4 mine, near Grindstone Station on Redstone Creek, 2½ miles east of Brownsville, Jefferson township.
16. Gilleland Coke Company. Leon mine, in Shear Hollow, 1¼ miles east of Tippecanoe, Franklin township.

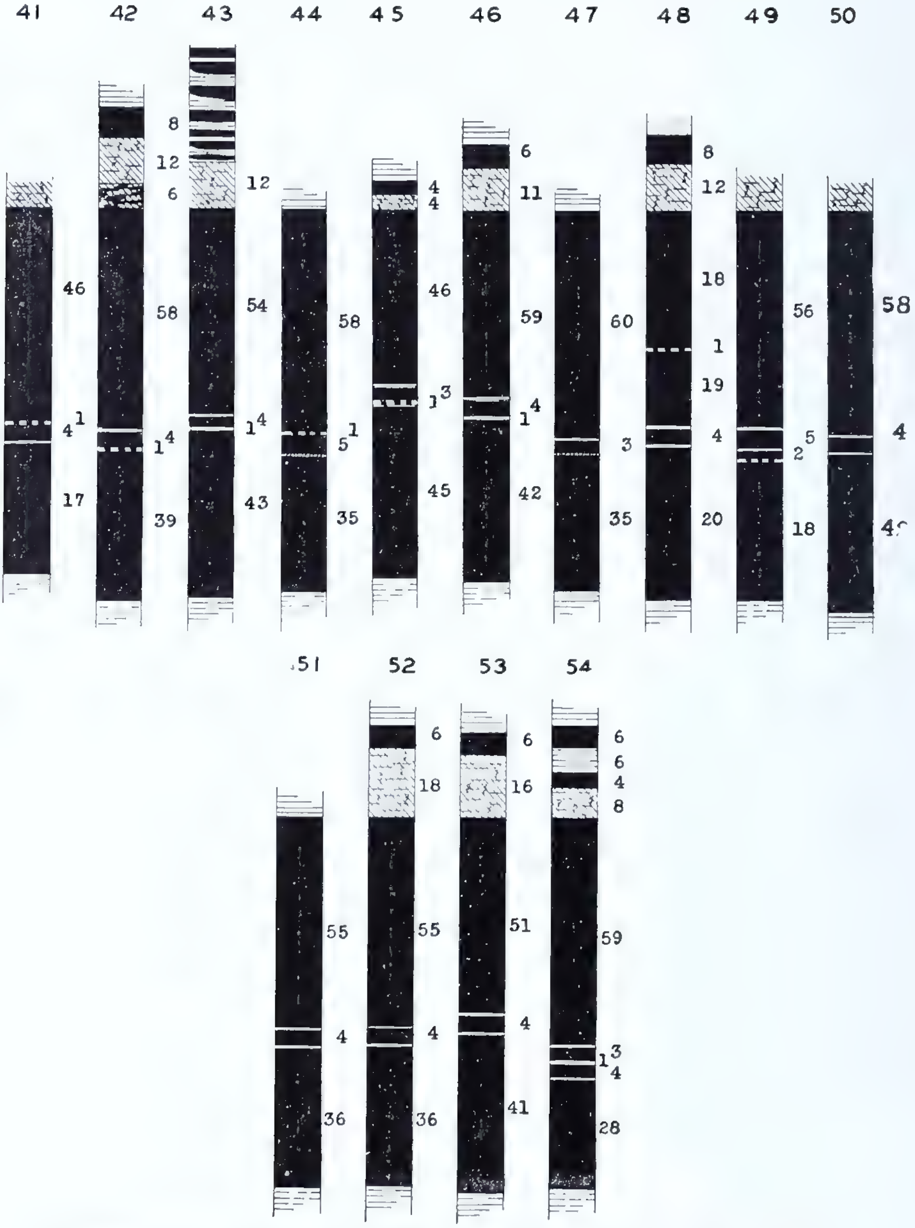


Figure 84. Sections of Pittsburgh coal in the River District, Fayette County.

17. H. C. Frick Coke Company. Colonial No. 1 mine, on Redstone Creek, near Smock, Franklin township.
18. Smock Coal Company. Grace mine, at Smock, on Redstone Creek, Franklin township.
19. Waltersburg Coke Company. Edna mine, 1 mile west of Waltersburg, Menallen township.
20. Lincoln Coal & Coke Company. Lincoln No. 1 mine, 1¾ miles southwest of Waltersburg, Menallen township.
21. H. C. Frick Coke Company. Dearth Nos. 1 & 2 mines, 2 miles northeast of New Salem, near National Highway, Menallen township.
22. Bourne-Fuller Coke Company. Searight mine, 1 mile southwest of Searights on National Highway, Menallen township.
23. Fayette Coke Company. Shamrock No. 1 mine, ½ mile southeast of New Salem, Menallen township.
24. H. C. Frick Coke Company. Buffington mine, at Buffington, ½ mile northwest of New Salem, Menallen township.

25. Connellsville Central Coke Company. Herbert mine, on Saltlick Run, 1½ miles southwest of Searights, Redstone township.
26. American Coke Corporation. Orient mine, on Dunlap Creek at Orient Station, Redstone township.
27. Brier Hill Coke Company. Brier Hill mine, on headwaters of Fourmile Run, on National Highway, 2 miles west of Searights, Redstone township.
28. W. J. Rainey, Inc. Royal mine, on headwaters of Rowe Run, 1½ miles southwest of Smock, Redstone township.
29. Superior Connellsville Coal Company. Sharpnack mine, on Luzerne-Redstone township line on Dunlap Creek, 3 miles southeast of Brownsville.
30. H. C. Frick Coke Company. Colonial No. 3 mine, on Redstone Creek, ¼ mile south of Rowe Run Station, Redstone township.
31. American Coke Corporation. American No. 1 mine, on Redstone Creek, ½ mile southwest of Linn Station, Redstone and Brownsville townships.
32. Diamond Coal & Coke Company. Pike mine, on Monongahela River, ⅓ mile north of Brownsville Station, Brownsville township.
33. Century Coke Company. Century mine, on Dunlap Creek, 1 mile south of Brownsville, Brownsville township.
34. Pittsburgh Steel Company. Alicia No. 1 mine, on east bank of Monongahela River at Lock No. 5, Luzerne township.
35. Forsythe Coal Company. Ferry mine, opposite Millsboro on Monongahela River, Luzerne township.
36. Hecla Coal & Coke Company. Isabella Nos. 1 & 2 mines, on east bank of Monongahela River, 1 mile south of Arensburg Ferry.
37. Thompson-Connellsville Coke Company. Thompson No. 2 mine, near Republic and 8 miles south of Brownsville, Luzerne township.
38. H. C. Frick Coke Company. Filbert Nos. 1 & 2 mines, on Dunlap Creek, 1½ miles northwest of New Salem, Luzerne township.
39. H. C. Frick Coke Company. Ralph mine, on Lilly Run, ¼ mile southwest of Dearth, German township.
40. H. C. Frick Coke Company. Lambert shaft, at Lambert, German township.
41. Fayette Coke Company. Shamrock No. 2 mine, 1¼ miles southeast of New Salem, German township.
42. H. C. Frick Coke Company. Footedale mine, at Footedale, 1½ miles southeast of New Salem, German township.
43. Blaho Coal Company stripping, on north branch of Coal Lick Run, ½ mile south of Messmore, German township.
44. Puritan Coke Company. Puritan No. 2 mine, on north branch of Coal Lick Run, 1 mile south of McClellandtown, German township.
45. South Fayette Coke Company. Emory mine, on south branch of Coal Lick Run, 3 miles northeast of Masontown, German township.
46. Peerless Fuel Company. Peerless mine, in southeast corner of German township, 1½ miles southwest of Highhouse, German township.
47. H. C. Frick Coke Company. Edinboro shaft, at Edinboro, German township.
48. H. C. Frick Coke Company. Gates No. 1 shaft, on Monongahela River at Gates, German township.
49. H. C. Frick Coke Company. Ronco shaft, on Monongahela River at Huron Junction, German township.
50. Consolidated Coke Company. Donald No. 4 mine, on Monongahela River, 1¼ miles northwest of Grays Landing, German township.
51. Consolidated Coke Company. Donald No. 3 mine, on Monongahela River at Grays Landing, German township.
52. Hecla Coal & Coke Company. Mack mine, at Griffin, 1 mile south of Masontown, Nicholas township.
53. H. C. Frick Coke Company. Leckrone No. 5 mine, 1½ miles south of Masontown and ¾ mile south of Griffin, Nicholas township.
54. Consolidated Coke Company. Donald No. 2 mine, on east bank of Monongahela River, 1 mile south of Grays Landing.

REDSTONE COAL.

The correlation of this bed and of the Sewickley coal above it, is uncertain in several areas, and only tentative until more detailed geologic work can be done. These beds are very lenticular, irregular, and poorly exposed. Their distance above the Pittsburgh bed appears to differ from place to place. Beds ranging from 40 to 125 feet above the Pittsburgh coal have been correlated as the Redstone.

The Redstone coal commonly is about 60 feet above the Pittsburgh bed. Although extremely variable in thickness, it is a valuable bed locally, and is mined for domestic use in several places. With the exhaustion of the Pittsburgh bed, it will assume some importance as a shipping coal. It is hard, and mines out in fair sized lumps; it is rather high in sulphur and ash.

At Lemont air shaft the coal is 4 feet thick; at Hill Farm 3 feet, and at Leith shaft 5 feet 7 inches thick. It carries several very thin bone partings that lessen its value. South and southwest of Uniontown the bed has been opened for domestic use and averages about 3 feet thick. Many thin lenses of bone, and knife blades of pyrite make its ash and sulphur rather high. In Springhill township the bed averages 4½ feet thick and is mined for house coal. It is poor in quality, and will probably never be valuable as a shipping coal.

The Redstone coal is persistent in the river district, but averages less than 2 feet thick. Where the bed thickens, partings of shale and bone make mining unprofitable except for house coal.

SEWICKLEY COAL.

A coal 120 to 175 feet above the Pittsburgh bed, the Sewickley, is opened at many places both for domestic and shipping coal. This bed ranges from a few inches to 6 feet in thickness. As a rule it is very dirty and impure, but locally where thick has excellent quality and commercial mines have been opened in it. The bed is variable in its physical and chemical qualities. Its sulphur averages approximately 3½ per cent, and its ash about 11 per cent. The volatile matter is very high. Washing and picking make it an excellent steam coal.

The Sewickley bed outcrops in the same general area as the Pittsburgh. It lies above the Pittsburgh and contains less acreage. This bed varies much in physical and chemical character throughout the county. Its chief importance at the present time is in the Connellsville basin and along Monongahela River in the vicinity of Brownsville. In the northern part of the river district it appears to be too thin to be mined at most localities. Its horizon is difficult to identify in large areas. A large number of mines were opened up in this bed during war time and it proved to be a most excellent steam coal. Although much thinner than the Pittsburgh, and slightly higher in ash and sulphur, it has been classed among one of the valuable commercial beds of the Connellsville basin. In fact, after the Pittsburgh bed has been depleted mining will be concentrated in this bed because of its easy accessibility. Where the Pittsburgh bed has been mined out, the Sewickley coal has been fractured to some extent but fortunately not enough to seriously affect mining. In some areas this fracturing is a help to mining because the water from the Sewickley drains down into the old workings of the Pittsburgh.

North Union township. The northernmost point where the Sewickley is mined in the Connellsville basin is in North Union township. In the northern part of this township the bed has a total thickness of 6 feet including a clay and shale parting ranging from 16 inches to 1 foot 10 inches thick 12 inches from the bottom. The middle bench of coal averages 2 feet 8 inches thick, and is separated from a top bench, 4 to 6 inches thick, by a bone and coal parting 4 to 10 inches thick. In the eastern part of the township, particularly in the vicinity of Youngstown and Stambaugh, the coal occurs in two benches, and has an aggregate thickness of 5 feet 4 inches. The top bench is 4 feet thick and is separated from a bottom bench, 10 inches thick, by a shale parting 6 inches thick. South of Stambaugh the coal thins and averages 4 feet 2 inches thick. In this vicinity the top bench averages 3 feet thick and is separated from a bottom bench, 1 foot 8 inches to 2 feet 4 inches thick, by a bone parting 1 to 3 inches thick.

In the vicinity of Evans the coal has become much parted by shale and usually occurs in five benches. The shale partings range from ¼ inch to 5 inches thick. The three main benches have an average thickness, in decending order, of 11, 18, and 15 inches. The bed is overlain by 6 inches of bone coal. In the vicinity of Coolspring and Shutes Run the Sewickley coal ranges from 4 feet 2 inches to 5 feet thick. It occurs in two or three benches. The top bench ranges from 2 feet to 2 feet 10 inches thick and is separated from a middle bench by 2 inches of bone coal. The middle bench ranges from 10 inches to 2 feet thick. Locally the bottom bench is lacking. Where present, it is separated from the middle bench by 1 inch of shale and averages 18 inches thick.

East of Uniontown the Sewickley is being mined on the National Highway. It ranges from 4 feet 6 inches to 5 feet 6 inches thick. It occurs in two or three benches. Where two benches are present the top bench averages 2 feet 8 inches thick separated from a bottom bench, 2 feet 6 inches thick, by a 1-inch shale parting. Where three benches are present the top bench is very thin, ranging from 2 to 6 inches thick. It is separated from the middle bench, 2 feet 6 inches thick, by a shale parting ½ inch thick. The middle bench is separated from a bottom bench, 2 feet 6 inches thick, by a bone parting 2 inches thick.

The Sewickley bed is not being mined on the western flank of the Uniontown syncline which passes through the city of Uniontown. It is of minable thickness in numerous localities and will eventually be mined.

South Union township. The Sewickley bed is being mined at several localities in South Union township. In the northern and eastern parts of this township the coal varies much in thickness and physical character. In the vicinity of Hopwood it occurs in five benches having thicknesses, in descending order, of 3, 7, 4, 12 inches, and 2 feet 2 inches. The three upper shale partings each average ⅛ inch thick. The bottom parting ranges from 3 to 8 inches thick. In the vicinity of Brownfield the coal averages 5 feet thick and is separated into three benches by two bone partings each 2 inches thick. The top bench of coal is 6 inches thick, the middle bench 2 feet, and the bottom bench 2 feet 6 inches thick.

In the southern part of South Union township the Sewickley coal averages 5 feet thick and is separated into two benches by a bone coal parting, the upper 2 inches thick, and the lower 4 inches thick. The top bench of coal is 4 inches thick, the middle bench 2 feet, and the bottom bench 2 feet 2 inches thick.

Georges township. The Sewickley coal is very important commercial fuel in Georges township. It is being mined more extensively each year as the Pittsburgh coal approaches depletion. Although its thickness and physical character vary much in short distances, it is of minable thickness and quality practically everywhere. Its chief area of importance is along the Baltimore and Ohio Railroad and on Coal Lick Run and its tributaries. South of Brownfield, and in the vicinity of Olyphant, the Sewickley bed ranges from 3 feet 6 inches to 4 feet 6 inches thick. It occurs in three benches separated by bone and shale partings. The upper bench ranges from 7 to 12 inches thick and is underlain by shale 1 inch thick. The middle bench has a uniform thickness of 12 inches and is underlain by a bone coal parting 2 to 3 inches thick. The bottom bench ranges from 18 inches to 2 feet 7 inches thick. Locally the bed occurs in four benches separated by shale partings ¼ inch to 5 inches thick. The aggregate thickness of the bed in these localities is 4 feet to 4 feet 6 inches. In the vicinity of Fairchance the physical character of the Sewickley bed is variable with the exception that it contains three bone and shale partings ranging from ½ inch to 4 inches thick. The top bench of coal ranges from 1 foot 8 inches to 3 feet thick, the middle bench ranges from 8 to 10 inches, and the bottom bench from 10 to 18 inches thick.

The Sewickley coal is being mined on Yorks Run in the vicinity of Smithfield. Here it averages 5 feet thick including one or two shale partings aggregating ⅛ inch thick. Where the bed occurs in two benches the top bench ranges from 2 feet 3 inches to 2 feet 10 inches thick and is separated from the bottom bench, 2 feet 4 inches thick, by a shale parting ⅛ inch thick. Where the coal occurs in three benches the top bench ranges from 5 to 10 inches thick and is separated from a middle bench, 1 foot 8 inches thick, by a shale parting ¼ inch thick. The bottom bench is separated from the middle bench by a shale parting ¼ inch thick. The bottom bench ranges from 2 feet 8 inches to 3 feet 2 inches thick.

On Coal Lick Run the Sewickley bed ranges from 4 feet to 6 feet 6 inches thick. Where thinnest it occurs in two benches. The top bench is 2 feet thick and is separated from a bottom bench 2 feet 6 inches thick by a bone coal parting 4 inches thick. In numerous localities the bed occurs in three benches overlain by bone coal. The top bench is usually 1 foot 9 inches thick separated from a middle bench, 7 inches thick, by a shale parting 1 inch thick. The bottom bench is 2 feet 2 inches thick and is separated from the middle bench by an extremely variable shale parting which ranges from a few inches to as much as 3 feet thick.

In the vicinity of Highhouse the Sewickley occurs in two benches overlain by shale or sandstone. The top bench ranges from 2 feet 2 inches to 2 feet 10 inches thick. It is separated from a bottom bench, 3 feet to 3 feet 9 inches thick, by a shale parting $\frac{1}{4}$ to $\frac{1}{2}$ inch thick.

Springhill township. The Sewickley coal is being mined at a few localities in Springhill township where it occurs as isolated areas in the hilltops. Its characteristics are very similar to those in Georges township. The coal occurs in three benches overlain by bone coal. The top bench ranges from 1 foot 4 inches to 1 foot 8 inches thick, and is separated from a middle bench by a bone coal parting $\frac{1}{2}$ inch thick. The middle bench averages 3 inches thick and is separated from a bottom bench by a bone coal parting 1 inch thick. The bottom bench ranges from 2 feet to 2 feet 4 inches thick.

Nicholson township. The Sewickley coal occurs in the hilltops of Nicholson township. The largest area of this coal is between Jacobs and Cats creeks. This bed has been opened up at a great many places within the last ten years and the coal has proven to be very good for steam and domestic fuel. On Cats Run, and south of Masontown, the Sewickley occurs in four to five benches and has an aggregate average thickness of 5 feet. The shale partings separating the benches of coal range from $\frac{1}{4}$ to $\frac{1}{2}$ inch thick.

Along Monongahela River the Sewickley varies much in physical character and occurs in two to four benches. The partings separating the benches are very rarely over 1 inch thick and average much less. The top bench ranges from 1 foot 11 inches to 2 feet 5 inches thick. Locally it has a small rider bench, 2 inches thick, above it. The bottom bench ranges from 2 feet 4 inches to 3 feet 4 inches thick and is locally separated into two divisions by $\frac{1}{2}$ inch bone partings.

German township. The Sewickley coal has an extensive outcrop in the western part of German township, but its chief commercial value is in the vicinity of Masontown and along Monongahela River.

It has been successfully mined in these localities. It usually occurs in three benches separated by shale partings ½ inch to 1 inch thick. The top bench ranges from 4 inches to 2 feet 8 inches thick, the middle bench from 4½ to 13 inches, and the bottom bench from 12 inches to 2 feet 4 inches thick. Locally a bony coal parting, 2 feet thick, separates the middle and bottom benches. North of Masontown along Monongahela River the Sewickley locally occurs in two benches separated by 8 inches of bone coal. The top bench ranges from 2 feet 8 inches to 3 feet thick, and the bottom bench averages 1 foot 8 inches thick.

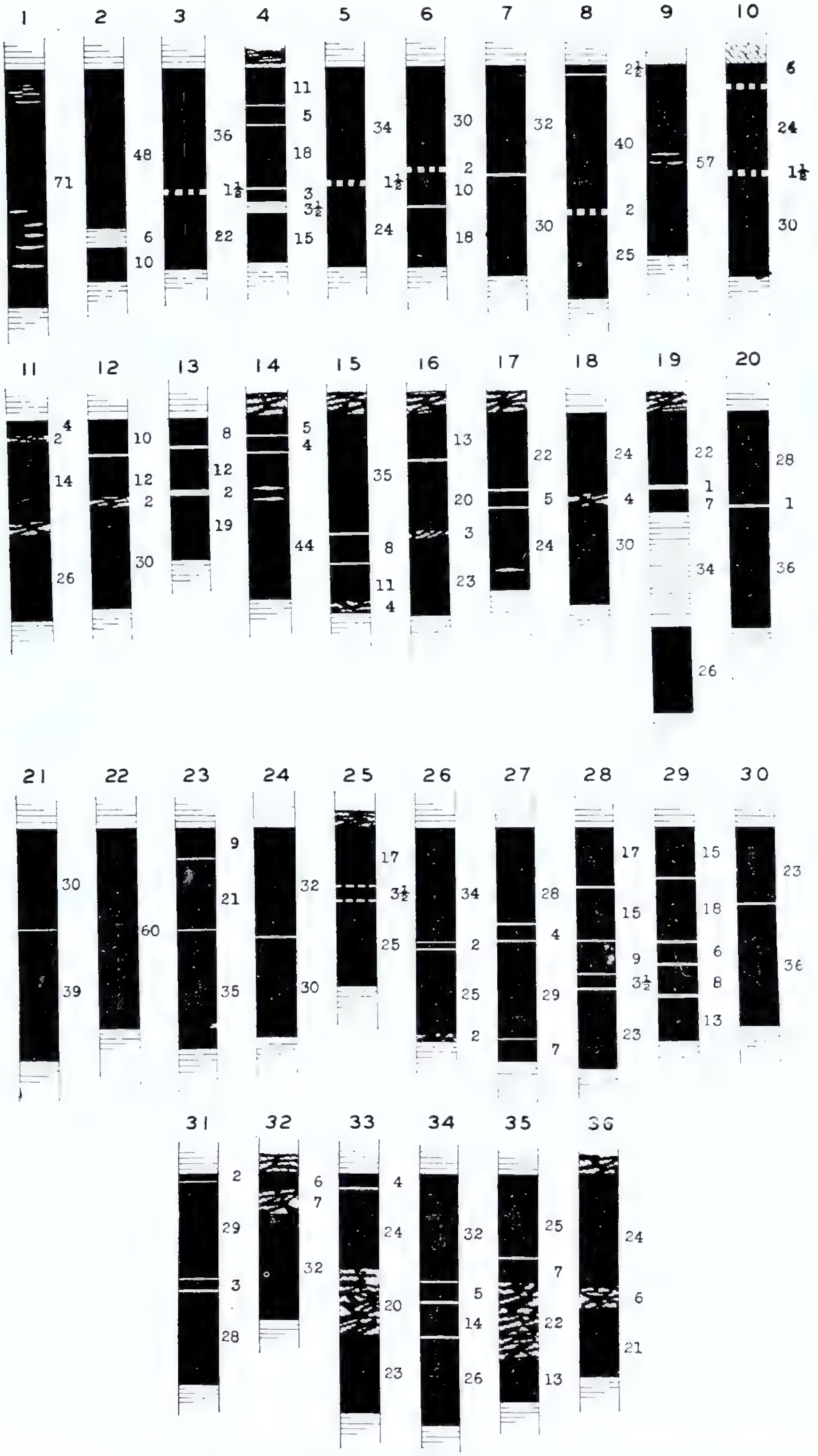


Figure 85. Sections of Sewickley coal in Fayette County.

1. Landman Coal & Coke Company. Percy mine, at Percy, 1 mile southwest of Mount Braddock, North Union township.
2. Gaddis Coal Company. Gaddis mine, at Stambaugh, 4 miles northeast of Uniontown, North Union township.
3. Faith Coal Company. Faith mine, ¼ mile southwest of Stambaugh, 3½ miles northeast of Uniontown, North Union township.
4. Evans Coal & Coke Company. Evans No. 3 mine, at Evans Station, 2 miles northeast of Uniontown, North Union township.
5. Buttermore Coal Company. Brinker mine, on B. & O. Railroad, near Coolspring, 2 miles northeast of Uniontown, North Union township.
6. Beeson Coal Company. Stewart No. 2 mine, on Shutes Run, 2 miles northeast of Uniontown, North Union township.
7. Kinsell Coal Company. Craig mine, 1¼ miles east of Uniontown, ¾ mile north of National Highway, North Union township.
8. Sadie Mining Company. Sadie mine, on National Highway, 1½ miles southeast of Uniontown, North Union township.
9. Meadowbrook Fuel Company. Meadowbrook mine, on B. & O. Railroad, 1 mile northwest of Hopwood, South Union township.
10. Brownfield Coal & Coke Company. Martha mine, 2 miles south of Uniontown, near Brownfield, South Union township.
11. Irwin Gas Coal Company. Playford No. 2 mine, 4 miles southwest of Uniontown, at Playford, South Union township.
12. Eureka Coal & Coke Company. Adams mine, on B. & O. Railroad near Brownfield, 4½ miles southwest of Uniontown, Georges township.
13. South End Coal Company. Mackey mine, on B. & O. Railroad near Oliphant, 5 miles south of Uniontown, Georges township.
14. Oliphant Coal & Coke Company. Jeffrey No. 1 mine, 1 mile west of Oliphant Furnace, Georges township.
15. Deyarmon Coal Company. Deyarmon mine, on state road 2 miles northeast of Fairchance, Georges township.
16. Laughead Coal Company. Laughead mine, on headwaters of Muddy Run, 1¼ miles west of Oliphant Furnace, Georges township.
17. Swaney Coal Company. Swaney mine, 1 mile west of Fairchance, Georges township.
18. R. B. Hays Coal Company. Hays mine, on Coal Lick Run, at Newcomer, Georges township.
19. Irwin Gas Coal Company. Irwin No. 11 mine, at Newcomer, on Coal Lick Run, Georges township.
20. Reilley Callaghan Coal & Coke Company. Nellie mine, 1¼ miles south of Highhouse, Georges township.
21. Hope Coal Company. Hope mine, 2½ miles north of Smithfield and 1½ miles south of Highhouse, Georges township.
22. Mutual Coal & Coke Company. Shaw mine, on Yorks Run, 3½ miles northeast of Smithfield, Georges township.
23. Shadyside Coal & Coke Company. Shadyside No. 1 mine, on Yorks Run, 4½ miles northeast of Smithfield, Georges township.
24. Reilley-Callaghan Coal & Coke Company. Callaghan mine, ¾ mile southwest of Highhouse, Georges township.
25. E. W. Hoffman. Hoffman mine, on Georges Creek, 2½ miles southeast of New Geneva, Springhill township.
26. Nicholson Coal Company. Patrick No. 1 mine, on Cats Run, 1 mile southeast of Masontown, Nicholson township.
27. Provins Coal Company. Provins mine, on Cats Run, 1½ miles southwest of Masontown, Nicholson township.
28. United States Fuel Company. Donald No. 6 mine, 1½ miles southwest of Masontown and 1½ miles east of Monongahela River, Nicholson township.
29. Baton Coal & Coke Company. American No. 1 mine, on east bank of Monongahela River, 1 mile southeast of Grays Landing, Nicholson township.
30. Baton Coal & Coke Company. American No. 4 mine, 2 miles south of Masontown and 1 mile east of Monongahela River, Nicholson township.
31. Stevenson Coal Company. Stevenson mine, on east bank of Monongahela River, ½ mile north of New Geneva, Nicholson township.
32. P. M. P. Coal Company. McManus mine, ¼ mile southwest of Masontown, German township.
33. C. E. Bortz. Ross No. 2 mine, ¾ mile south of Masontown, German township.
34. Sterling Sisters Coal Company. S. & S. mine, 1 mile west of Masontown, German township.
35. Sterling & Graham Coal Company. Stella No. 1 mine, on east bank of Monongahela River, 1¾ miles west of Masontown, German township.
36. Sterling and Graham Coal Company. Stella No. 2 mine, on east bank of Monongahela River, 1¾ miles southwest of Masontown, Georges township.

UNIONTOWN COAL.

The Uniontown coal, lying 250 to 305 feet above the Pittsburgh bed, is thin and unimportant everywhere in the county. In the vicinity of Uniontown, where it furnishes a small supply of house coal, it is 3 feet 2 inches thick, including 4 inches of clay in the center of the bed. It has been recorded in many shaft sections and drill holes, but is seldom thick enough for mining.

WAYNESBURG COAL.

The Waynesburg coal is unimportant in the Uniontown-Connellsville district, and has been opened in only a few places. It is mined in Dunbar township, where its maximum thickness is 3 feet 4 inches. A 3-inch bone binder, 13 inches from the bottom, cuts the bed into two benches. The coal is extremely high in ash, and rather high in sulphur.

The Waynesburg coal has been mined more extensively in the river district, but it is not persistent. On Redstone Creek the bed is locally 10 feet thick but is composed of alternating bands of coal and clay. Where the bed is thinner the quality is better, and the coal is used for domestic fuel. On Dunlap Creek the bed is very impure. In the vicinity of Heisterburg and Merrittstown it averages 5 feet thick, and occurs in several benches, one of which is often clean enough to be mined. On Wallace Run the bed is 4 feet 6 inches thick, with a few inches of bone coal 12 inches from the roof. North of Masontown it is split by three clay partings, and is 7 feet 2 inches thick.

The Waynesburg bed outcrops in the center of the Uniontown syncline (Connellsville basin) in the eastern part of Fayette County. Its outcrop is also extensive in the river district in German, Redstone, and Luzerne townships where it is preserved by the Lambert syncline. It is of very little commercial importance in the Connellsville basin, and most attempts to mine it have been unsuccessful because of the competition of the Sewickley and Pittsburgh beds. It will probably have commercial value in the future, particularly if it is used in some prepared form for power purposes. This bed averages less than 3 feet thick in the eastern part of Fayette County. and is high in ash and sulphur. In some localities it has been mined for local fuel and occurs in a single bench 1 foot 6 inches to 2 feet 4 inches thick. In other localities it occurs in two benches separated by a bone parting 2 to 10 inches thick. The top bench ranges from 1 foot 6 inches to 2 feet 2 inches thick, and the bottom bench is approximately 12 inches thick.

The most important area of Waynesburg coal in Fayette County is in German township. It is being mined at many places in this township. The mines are all small and the coal is used principally for domestic fuel. Some mines are loading the coal for shipment.

In the vicinity of Masontown, and on Browns Run, the Waynesburg ranges from 5 to 8 feet thick including impurities. The coal occurs in three to four benches separated by shale partings of variable thickness. In the vicinity of Edenborn the top bench is 14 inches thick separated from the middle bench, 2 feet 1 inch thick, by a shale parting 1 inch thick. The middle bench is separated from the bottom bench, 3 feet thick, by a shale parting 7 inches thick. South of Edenborn the coal occurs in four benches separated by shale partings 1½, 9, and 3 inches thick, in descending order. The coal benches have the following thicknesses, in descending order: 17 inches, 2 feet 4 inches, 3 feet 3 inches, and 6½ inches.

In the vicinity of Ronco the bed occurs in three benches; the top 14 inches thick, the middle 2 feet 1 inch thick, and the bottom 1 foot 8 inches thick. The top shale parting is 1½ inches thick, and the bottom shale parting 8 inches thick.

In the vicinity of Gates, and on Middle Run, the Waynesburg bed has a maximum aggregate thickness of 6 feet. It averages approximately 5 feet. The coal is extremely variable in physical character, and occurs in three to six benches. These benches are separated by bone and shale partings ranging from ½ inch to 6½ inches thick. The bottom bench is thickest and ranges from 2 feet to 2 feet 10 inches thick. Along Monongahela River north of Gates the Waynesburg is 6 feet thick including a shale parting in the middle 2 feet thick. The bed is overlain by 12 inches of bony coal.

The Waynesburg bed outcrops in an extensive area between the big bend in Monongahela River in Luzerne township. Here it is an important supply for domestic fuel and when market conditions are favorable it is loaded and shipped. The coal is rather high in ash and sulphur, and mining conditions are difficult because of the shale and bone partings in it. The top bench generally has bone coal streaks in it. The coal characteristically occurs in two benches. The top bench ranges from 1 foot 6 inches to 2 feet 6 inches thick. The shale parting below it averages 12 inches thick. The bottom bench ranges from 2 feet to 2 feet 6 inches thick. In the northern part of Luzerne township the top bench averages 2 feet thick, and the bottom bench 2 feet 6 inches thick.

The Waynesburg coal has an extensive outcrop in Redstone township but is being mined in only a few localities. The thickness and character of the bed are extremely variable in this township. Locally it is as much as 10 feet thick including a great many shale and bone coal partings. Locally, where it is thinner, it has commercial value. It is being mined on Cherry Camp Run where it occurs in two benches separated by a clay parting approximately 2 feet thick. The top bench is 17 inches thick, and the bottom bench 1 foot 7 inches thick. On Rowe Run the Waynesburg bed occurs in three benches. The top bench ranges from 9 to 14 inches thick and has 3 inches of clay under it. The middle bench is usually 7 inches thick and is underlain by 1 inch of bony coal. The bottom bench ranges from 2 feet 4 inches to 2 feet 10 inches thick.

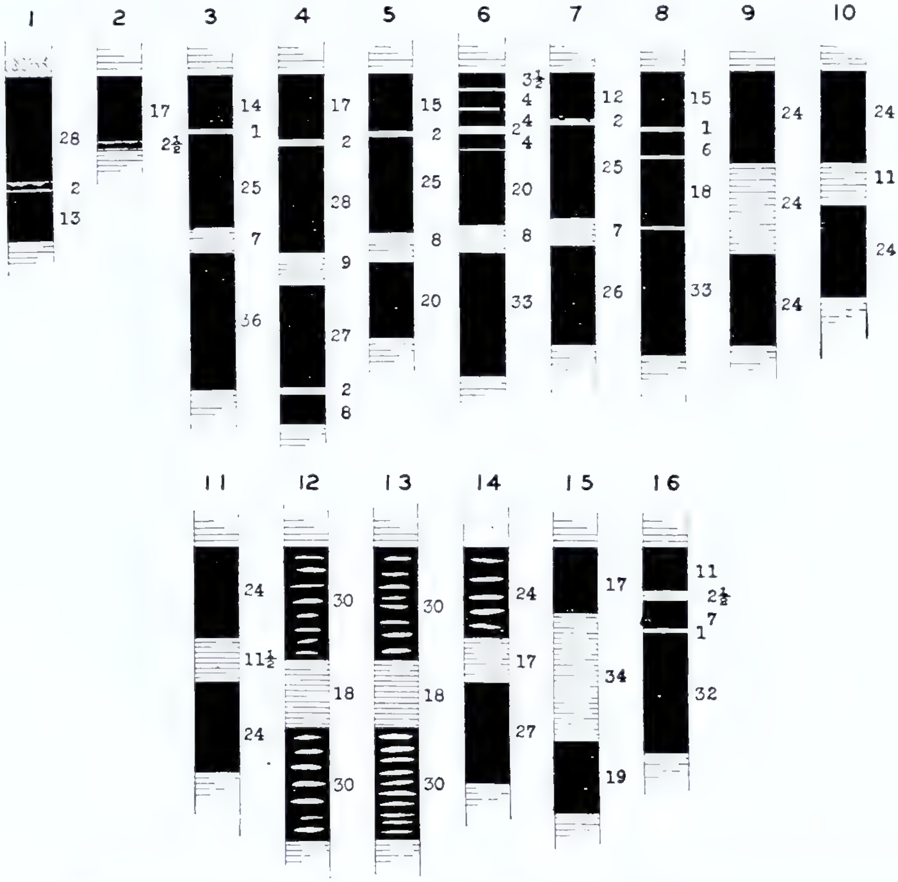


Figure 86. Sections of Waynesburg coal in Fayette County.

1. Country bank, 1½ miles west of Dunbar, Dunbar township.
2. Outcrop on road at Hatfield, 1½ miles south of Uniontown, South Union township.
3. Moser Run Coal Company. Moser mine, at Edenborn, 2 miles north of Masontown, German township.
4. R. W. Ligtelburn. Pross mine, ¼ mile south of Edenborn, and 1¾ miles north of Masontown, German township.
5. Rush Coal Company. Rush mine, on Browns Run, near Ronco, 1½ miles northwest of Masontown, German township.
6. Hartley Coal Company. Hartley mine, ½ mile northeast of Gates, on Middle Run, German township.
7. Fiat Coal Company. Boyd mine, on Middle Run, 1¼ miles northeast of Gates, German township.
8. John G. Ross. Harriett mine, on Middle Run, 1½ miles northeast of Gates, German township.
9. P. & Y. Coal Company. Christopher mine, on east bank of Monongahela River, 1 mile north of Nemacolin, German township.

10. East Riverside Coal Company. Jacobs mine, on east bluff of Monongahela River, 1½ miles north of Nemacolin, Luzerne township.
11. Cook Coal & Coke Company. Frances mine, on east bluff of Monongahela River, Luzerne township.
12. Elmo Coal Company. Arensburg mine, east bank of Monongahela River at Arensburg Ferry, Luzerne township.
13. Monongahela Valley Coal & Coke Company. Colbert mine, near Lock No. 5, 2 miles southwest of Brownsville, Luzerne township.
14. National Highway Fuel Company. Chalfant mine, on National Highway, 2 miles southeast of Brownsville, Luzerne township.
15. Cherry Camp Coal Company. Cherry Camp mine, at Belbois Station, on Rowe Run, Redstone township.
16. Belbois Coal Company. Belbois mine, at Belbois Station, on Rowe Run, Redstone township.

Waynesburg A Coal.

The Waynesburg A coal, lying about 60 feet above the Waynesburg coal, is thin but has good quality. It is almost entirely absent in the Uniontown-Connellsville district. In the river district it has been opened for house fuel. It is 3 feet 6 inches thick in the Lambert shaft section, on Middle Run 4 feet 6 inches, and on Antram Run 3 feet thick. The coal thins within a few feet.

Washington Coal.

The Washington coal is 2 feet 5 inches thick in Lambert shaft, and 141 feet above the Waynesburg. It rarely is over 2 feet thick in the county, and has never been mined.

Several other beds lying above the Washington coal are too thin to be mined in Fayette County.

CHAPTER XIV.

GREENE COUNTY.

INTRODUCTION

Greene County has more unmined coal than any other county in Pennsylvania and is estimated to contain one-fourth of the reserves of the Pittsburgh coal in the State. Extensive coal mining has been limited to the Monongahela River district where the Pittsburgh coal outcrops. The important coals, with the exception of the Waynesburg bed, have no outcrops in the county west of Monongahela River, and lie at great depth. Since the more easily accessible coal along the river is rapidly being worked out, shaft mining has started in other parts of the county. Drilling for oil and gas has shown several other coals below the Pittsburgh bed but their identity is uncertain and it is impossible at present to estimate their tonnage. Their development will be delayed because of the great depth at which they lie.

Greene County has at least eight workable coals. The Pittsburgh is the only one that can be worked in large areas; the others are workable only locally, because they are for the most part too thin and dirty to be commercially valuable. Thirty beds are known in the county. They range from a few inches to 6 feet thick, but average less than 12 inches. Their total thickness approximates 25 feet.

The river district, from which most of the production comes, has ample transportation facilities. The Monongahela Division of the Pennsylvania Railroad follows the valley of Monongahela River south from Pittsburgh, and carries coal both north and south. The Monongahela River with its locks is another means of transportation to Pittsburgh and points south. The central and western parts of the county are not well served by railroads. The Wheeling Coal Railroad enters the county from West Virginia at the State line near the northern county line, follows it a few miles, and then enters Washington County. The Waynesburg and Washington Railroad runs between Washington and Waynesburg. The Morgantown and Wheeling Railroad, which connects with the Monongahela Division of the Pennsylvania Railroad at a point north of Morgantown, West Virginia, opens up a small district in the southern part of the county.

In the absence of railroads, much coal is hauled over the highways for local and domestic use. These highways are mostly dirt and are good in summer but nearly impassable in winter.

The county is decidedly hilly. It is a thoroughly dissected region with a relief of about 800 feet. The elevations range from 860 to 1600 feet. Narrow ridges and rounded knobs with steep slopes at their base are characteristic. The streams have entrenched themselves in narrow valleys with rather steep slopes. Terraces and benches occur along the larger tributaries, particularly in the eastern portion of the county.

STRUCTURE.

Greene County is crossed in a general northeast-southwest direction by a number of anticlines and synclines forming a series of waves which, from east to west, are as follows: Lambert syncline, Brownsville anticline, Whiteley syncline, Belle Vernon anticline, Waynesburg syncline, Amity anticline, Nineveh syncline, and Washington anticline. They reach their highest point, 750 feet above sea, on the Brownsville anticline near Willow Tree and their lowest point on the Nineveh syncline, in which the Pittsburgh coal is only 100 feet above sea level and more than 1,000 feet below the surface.

The bottom of the Pittsburgh coal was used as a datum plane for drawing the structure contours.

Lambert syncline begins at Willow Tree and extends northeast across Monongahela River. The Pittsburgh coal is 450 feet above tide at its deepest point in the syncline. The slopes are gentle on both flanks of the basin.

Rocks rising to the west form an irregular arch, Brownsville anticline. This structure is irregular and not well-defined in Greene County.

Whiteley syncline, lying west of Brownsville anticline, is another minor structure. Its slopes are very gentle and its bottom wide and shallow, tending to deepen southward.

Belle Vernon anticline, with its axis running through the town of that name, and extending to the southeastern part of Greene County, is a pronounced and an important structural feature. Where the anticline crosses the Monongahela at Charleroi, the Pittsburgh coal is 1,000 feet above sea level. Both slopes of the anticline are gentle.

Waynesburg syncline is an unimportant structural feature lying west of Belle Vernon anticline.

Amity anticline is the next structure to the west. It tails out soon after entering the county and its flanks are not well-defined. The elevation of the Pittsburgh coal on the axis varies between 420 and 460 feet above sea.

Nineveh syncline, which lies west of Amity anticline, is one of the deepest in the Appalachian coal basin, and has a well-defined axis. The southeastern slope of the syncline is irregular and the steepest dips are in the vicinity of the town of Nineveh. Farther south the dips are gentle. On the western flank the rocks rise abruptly to Washington anticline.

Washington anticline crosses the extreme northwest part of the county. The dips are steep on the southeastern flank, averaging 100 feet per mile, between Graysville and Bristoria, where the dip locally increases to 250 feet per mile. A roughly triangular dome has its center near Jacksonville. Farther north the axis rises again.

STRATIGRAPHY.

Greene County is geologically the highest point in the western part of the State because it contains higher beds in the Greene group than any other county. The Greene and Washington groups of Permian age and the Monongahela group of Pennsylvanian age of the Carboniferous constitute the outcropping bedrocks. Deposits of gravel, clay, and sand of Quaternary age occupy the valley bottoms. The Greene group covers large areas in the county and is chiefly composed of easily weathered sandstones and shales. The upper part of the group has been removed by erosion. That which remains is about 800 feet thick. The Washington group which lies beneath it has not undergone much erosion. It is composed chiefly of sandstones, shales, and coals, and has a maximum thickness of 400 feet. The Monongahela group, 270 to 400 feet thick, is almost intact throughout the county. It contains shales and sandstones, over 100 feet of limestone, and five coal beds which are locally workable. The lower groups are known only from drill records and little definite knowledge is to be had concerning their character.

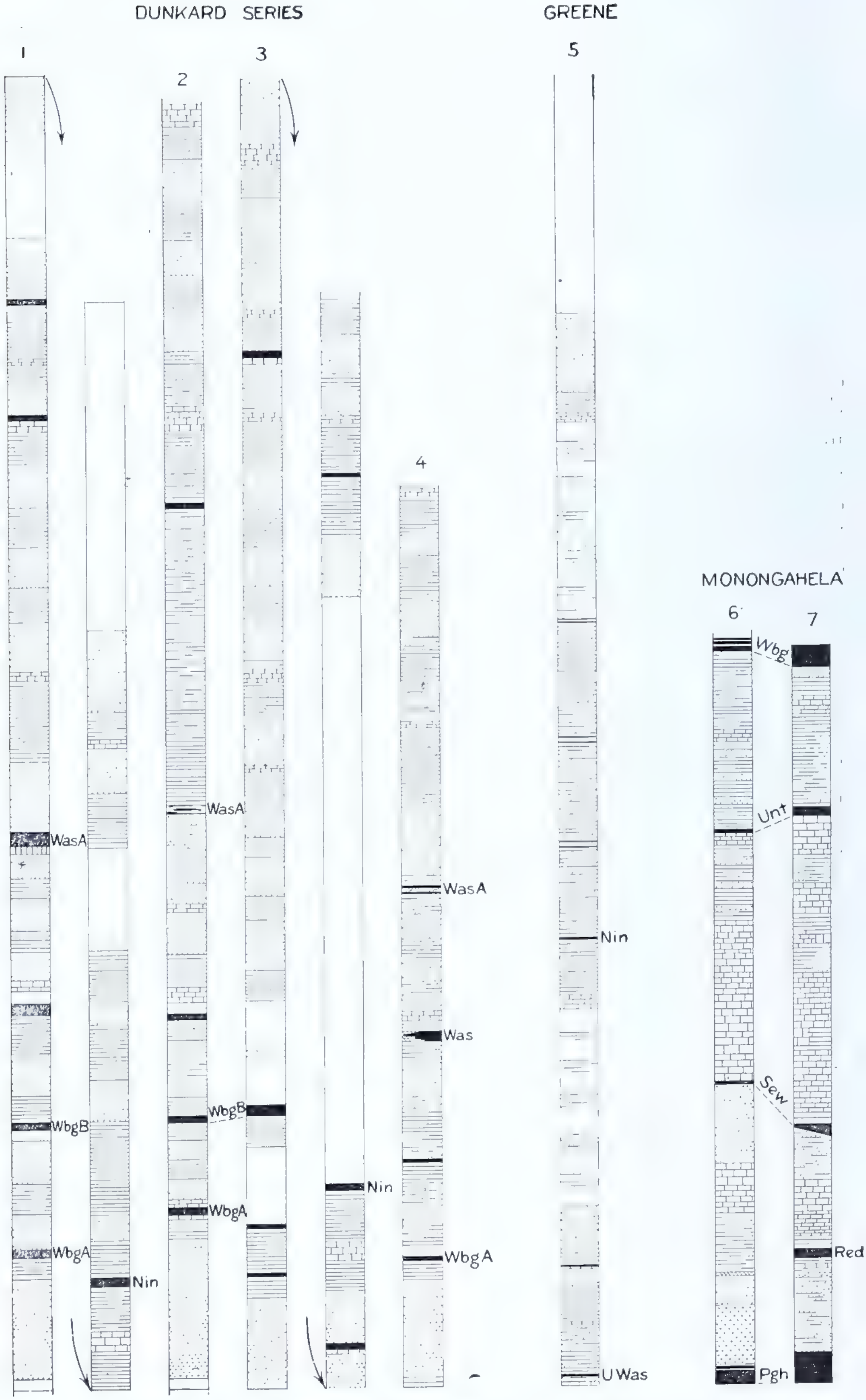


Figure 87. Stratigraphic sections. Greene County

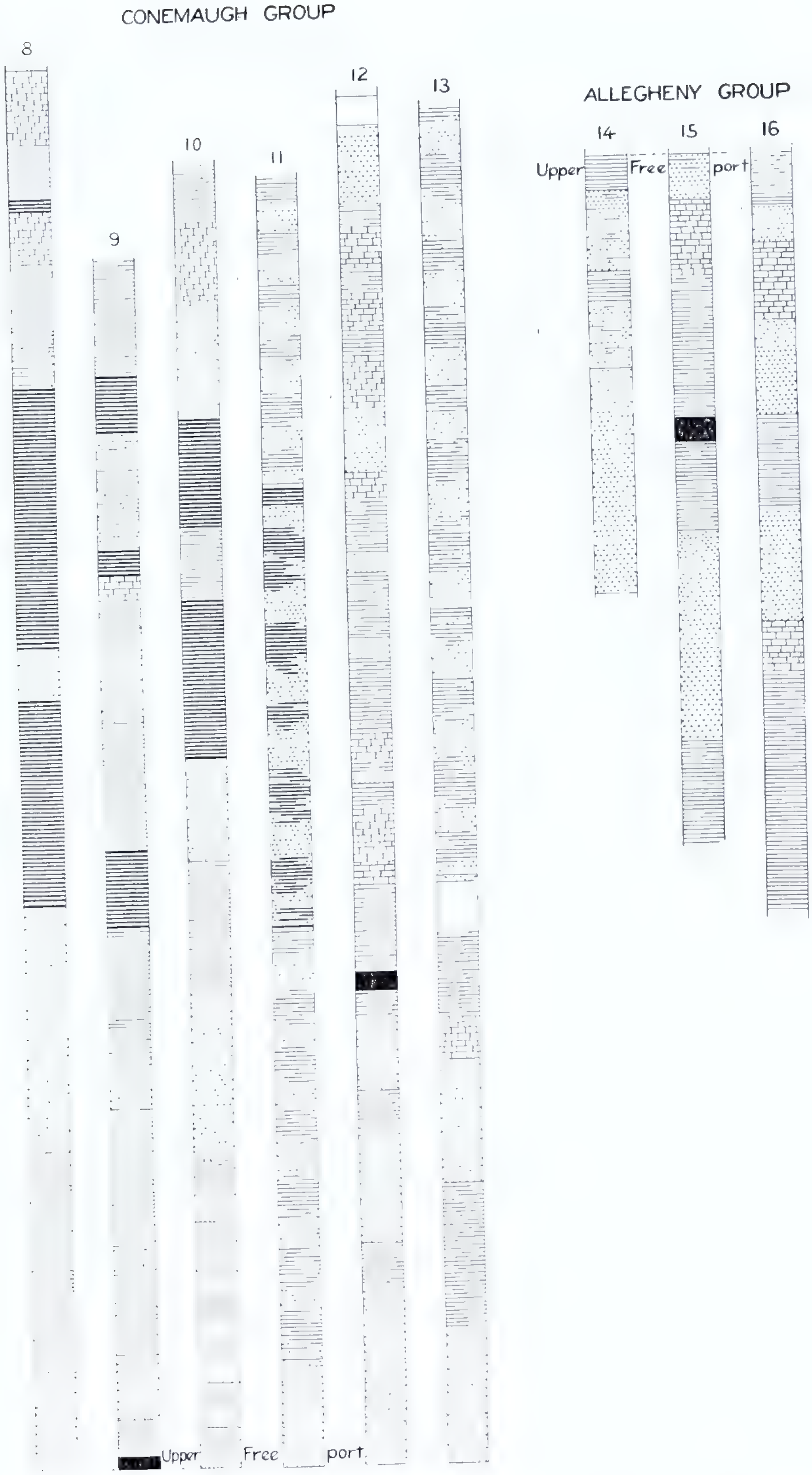


Figure 88. Stratigraphic sections. Greene County.

1. On Dunkard Creek, I. C. White. U. S. G. S. Bulletin 65, p. 22.
2. On Colvins Run, I. C. White. U. S. G. S. Bulletin 65, p. 23.
3. Aleppo Township, I. C. White. U. S. G. S. Bulletin 65, p. 24.
4. Dunkard Creek. Topographic and Geologic Survey Commission of Pennsylvania, 1906-1908. p. 144.
5. Dunkard Creek, Greene group. Topographic and Geologic Survey Commission of Pennsylvania, 1906-1908, p. 141.
6. At Rices Landing, Monongahela group. Topographic and Geologic Survey Commission of Pennsylvania, 1906-1908, p. 149.
7. Generalized section of Monongahela group. U. S. G. S. Waynesburg Folio.
8. Conemaugh group, 1¼ miles west of Deep Valley. U. S. G. S. Bulletin 304, Plate II.
9. Conemaugh group, 2 miles southeast of Graysville. U. S. G. S. Bulletin 304, Plate II.
10. Conemaugh group, 2 miles east of Waynesburg. U. S. G. S. Bulletin 304, Plate II.
11. Conemaugh group at Waynesburg. U. S. G. S. Bulletin 304, Plate II.
12. Conemaugh group at Greensboro. U. S. G. S. Bulletin 304, Plate II.
13. Conemaugh group, ¾ mile west of Ruff Creek. U. S. G. S. Bulletin 304, Plate II.
14. Allegheny group, 1¼ miles west of Deep Valley. U. S. G. S. Bulletin 304, Plate II.
15. Allegheny group, 2 miles east-southeast of Graysville. U. S. G. S. Bulletin 304, Plate II.
16. Allegheny group, 1½ miles west of Nineveh. U. S. G. S. Bulletin 304, Plate II.

COALS.

Greene County contains the coals highest in the Carboniferous system in Pennsylvania. Thirteen coals outcrop in the county, of which eight are locally workable and the others are thin and unimportant. A coal bed, lying between 625 and 720 feet below the Pittsburgh, has been encountered in many drill holes, and is tentatively correlated with the Upper Freeport coal which, in eastern Washington County, is 600 feet below the Pittsburgh coal.

PITTSBURGH COAL.

The Pittsburgh coal outcrops along the valley of Monongahela River and its tributaries on the eastern border of the county and also up Dunkard creek about five miles. The Pittsburgh coal is probably workable everywhere in Greene County but it varies in thickness. It has good coking qualities and during recent years has been bought up by large steel companies as a reserve of by-product coal.

This coal is characteristically a double bed, having a roof division separated from a lower division by a clay parting from ¼ inch to 3 inches thick. In the northern part of the county especially, a roof shale 8 to 12 inches thick comes in over the upper division of the bed. The roof division of the coal varies from 2 inches to 8 feet thick, and is cut by many clay partings. The coal of the roof division is very high in ash and sulphur. The lower and minable division of the bed varies from 3 inches to 9 feet thick, including three persistent partings. These thin partings separate the lower division into four distinct benches: the upper or breast, the bearing-in, the brick, and the lower bottom. The breast coal is generally the best and thickest part of the bed and in this county is free from any distinct impurities. The bearing-in bench is usually 2 to 4 inches thick with a thin bone binder above and below it, and is so soft that the miners use it to bear in on the other coal to gain a working face. The coal is so soft that it mines out as slack. The brick coal is so named because cleavage planes tend to make it break and mine out in brick-shaped blocks. The brick coal usually has excellent quality although locally it is impure and not mined. The lower bottom is the bottom bench of the lower division. It is generally very impure and carries numerous shale partings. In places, however, a few inches at the top is good clean coal and is mined with the brick coal.

The roof division of the Pittsburgh bed thickens and the lower division thins northward. The characteristic binders are everywhere present. In Dunkard, Monongahela, and Jefferson townships the Pittsburgh coal has a thin top division and a 9-foot lower division. In southern Greene County near the State line the Pittsburgh coal is 7 feet thick with ½ inch of slate 6 inches above the bottom. On Dunkard Creek the total thickness of the bed is 11 feet, including a clay parting 8 inches above the bottom. At Greensboro the roof and main clays are each 12 inches thick; the lower division of the coal is 9 feet thick with benches of 6, 1, and 2 feet. The partings are very thin. The coal appears to be thinnest in the mouth of Cheat River.

Mining of the Pittsburgh bed is confined to the townships along Tenmile Creek east of Waynesburg, and those bordering Monongahela River. Greene County originally contained 361,000 acres of the Pittsburgh bed. Only 2,000 acres have been mined out to and including 1924 and practically all of this acreage is in townships bordering on Monongahela River.

Morgan township. The Pittsburgh bed does not outcrop in this township, and only one mine is working in it. In the northern part of this township the Pittsburgh bed averages 6 feet thick. The roof is shale, and the bottom, fire clay. A 12-inch layer of soft slate is present above the coal. The breast coal ranges from 3 feet to 3 feet 4 inches thick. The bearing-in bench is 3 inches thick with top and bottom partings ¼ to ½ inch thick. The bottom bench is 2 feet 8 inches thick. Clay veins and rock rolls are common in some areas. Along Tenmile Creek the Pittsburgh bed averages 7 feet 6 inches thick with a draw slate above it 12 to 18 inches thick. The bottom is fire clay. The main bench, or breast coal, is 3 feet 4 inches thick. The bearing-in bench ranges from 2½ to 4 inches thick with two thin bone coal partings above and below it. The bottom bench averages 2 feet 10 inches thick.

Jefferson township. The Pittsburgh coal does not outcrop in this township. The mines are shafts. In the northern part of the township the Pittsburgh coal averages 6 feet 2 inches thick. It is divided into the usual three benches; a top one 3 feet 2 inches thick, the middle, or bearing-in bench, 3 inches thick, and the bottom bench 3 feet thick. The bearing-in bench ranges from $\frac{1}{4}$ to $\frac{3}{4}$ inches thick. The bottom is fire clay, and the roof, draw slate. In the vicinity of Rices Landing, where the coal is shafted to, 150 feet, the entire bed averages 6 feet thick with the usual physical character. In the vicinity of Jefferson the bed is somewhat thicker; the increase in thickness being in the upper bench which averages 3 feet 4 inches thick.

Cumberland township. The Pittsburgh bed does not outcrop in this township. The mines are shafts and slopes. The bed ranges from 7 to 8 feet thick, the thickest area being in the southeastern part in the vicinity of Gates.

East of Rices Landing, on Monongahela River, the bed is 6 feet 10 inches thick not including 12 inches of draw slate above the coal. The bottom is fire clay. The top bench is 3 feet 4 inches thick. The bearing-in bench is 4 inches thick with two thin bone partings above and below it. The bottom bench is 3 feet thick. In the vicinity of Jacobs Creek and Muddy Run the coal averages 7 feet 6 inches thick. The top bench ranges from 2 feet 9 inches to 4 feet thick. Locally the usual bearing-in bench is not present and a shale parting 1 inch thick takes its place. The bottom bench underneath the parting is usually 3 feet thick. In the vicinity of Gates the bed averages 8 feet thick not including the usual draw slate, 10 to 16 inches thick, above the bed. The coal varies from its usual physical character in this area in that it has one or two extra thin bone partings. The top bench ranges from 4 feet 3 inches to 4 feet 9 inches thick. Locally it contains a shale parting $\frac{1}{8}$ inch thick near the middle. The bearing-in bench ranges from 3 to 5 inches thick, and is separated from the top and bottom benches by thin bone partings. The bottom bench is usually 3 feet 4 inches thick and is locally split into two divisions by a bone parting $\frac{1}{8}$ inch thick at various positions in the bench.

On Little Whiteley Creek the physical character of the bed is practically the same. An extra bone parting is usually present about 5 inches above the top bearing-in parting.

Monongahela township. The Pittsburgh bed is deep under cover in all of Monongahela township except along Monongahela River and on Dunkard Creek. The Pittsburgh bed ranges from 7 feet 1 inch to 9 feet thick. With minor departures it has the usual physical character of the Pittsburgh bed. In the northern part of the township along Little Whiteley Creek and Monongahela River the bed averages 8 feet 6 inches thick. The top bench is usually 5 feet thick with a bearing-in bench, 4 inches thick, below it. The bottom bench is 3 feet 5 inches thick. In the vicinity of Grays Landing the bed is 8 feet thick. The top bench ranges from 4 feet 3 inches to 4 feet 8 inches thick. The bearing-in bench is 3 inches thick with ¼ inch bone partings above and below it. The bottom bench ranges from 2 feet 5 inches to 3 feet 2 inches thick. The bottom is fire clay. The roof is draw slate ranging from 8 to 18 inches thick. All of the mines are shaft in this part of the township. In the vicinity of Lock No. 7 the Pittsburgh bed thickens to a local average of 9 feet. In this vicinity the top bench is divided by a ½-inch shale parting 1 foot 11 inches above the top bearing-in parting. The entire upper bench averages 4 feet 5 inches thick. The bearing-in bench is 3½ inches thick not including two 1-inch shale partings. The bottom bench is clean coal averaging 4 feet 2 inches thick. In this vicinity the roof coal is a mixture of bone and coal having a maximum thickness of 6 feet.

In the vicinity of Mapletown the Pittsburgh bed averages 8 feet 10 inches thick. The top bench is separated into two divisions by a shale parting ½ inch thick 3 feet below the top. The bottom division is 1 foot 8 inches thick. The bearing-in bench is 4 inches thick with a shale parting ½ inch thick above and below it. The bottom bench is 3 feet 9 inches thick. The bottom is shale.

In the vicinity of Greensboro the bed also averages 8 feet 10 inches thick. The parting of bone coal in the upper bench thickens to 2¼ inches and is in the center of the bench. The bearing-in bench is 12 inches thick with a top parting ¾ inch thick and a bottom one ¼ inch thick. The lower bench, 3 feet thick, is separated into two benches of equal thickness by a ¼ inch bone parting.

Between Greensboro and Lock No. 8 the bed ranges from 7 feet to 8 feet 2 inches thick. The physical character of the bed is quite variable in this area. In some localities the top bench is 4 feet thick and clean; in others it is somewhat thicker but contains one or more bone partings. The bottom bench, ranging from 2 feet 4 inches to 3 feet 5 inches thick, is locally clean but usually has two or more thin bone partings in it. In some mines enormous rock rolls have cut out the coal entirely and have caused much expense in large areas where the coal is thin on account of them.

On Dunkard Creek the Pittsburgh bed is 7 feet 2 inches thick. In some localities the coal has been entirely cut out by sandstone which is evidently the refilling of old stream channels. The top bench ranges from 4 feet to 4 feet 5 inches thick. The bearing-in bench is 6 to 8 inches thick with bone partings above and below it ranging from ¼ inch to 1½ inches thick. The bottom bench ranges from 2 feet 9 inches to 3 feet thick.

Dunkard township. The Pittsburgh bed is mined by drifts in Dunkard township since the bed outcrops along Dunkard Creek and Monongahela River. The entire bed ranges from 5 feet to 7 feet 4 inches thick. The thinnest coal is local in the northern part of the township, the range in thickness in this vicinity being from 5 to 8 feet. An unusual departure from the usual physical character of the Pittsburgh bed is a bone parting 6 inches thick in the main or breast coal. It occurs from 8 to 12 inches below the draw slate. The bearing-in bench is 3 to 4 inches thick but is locally absent. The bottom ranges from 2 feet 8 inches to 4 feet 4 inches thick.

In the vicinity of Crows Ferry (Dilliner) the Pittsburgh coal is 7 feet thick. In a new mine, opened in 1924, several bone partings ranging from $\frac{1}{4}$ to $\frac{3}{4}$ inches thick split the bottom part of the bed into several benches. The top bench is separated into two divisions by a bone parting 7 inches thick. It has 10 to 14 inches of coal above it.

In the vicinity of Point Marion the Pittsburgh coal is 7 feet 2 inches thick. The top bench is invariably separated into two parts by a bone parting ranging from $\frac{1}{4}$ inch to 5 inches thick. It is located near the middle of the bench. A bearing-in bench ranges from 4 to $5\frac{1}{2}$ inches thick. The bone partings above and below it range from $\frac{1}{2}$ inch to $1\frac{1}{2}$ inches thick. The bottom bench, ranging from 3 feet 6 inches to 4 feet thick, is locally entirely clean. It generally contains a bone parting ranging from $\frac{1}{2}$ inch to 3 inches thick.

The Pittsburgh bed is deep under cover in the townships of Greene County wherein it has not been described. This undeveloped area of the Pittsburgh bed comprises one of the most important reserves of soft coal in Pennsylvania. Although very few tests have been made on the cores obtained from diamond drill holes, there is reason to believe that the southwestern extension of the Connellsville basin will contain coals very suitable for coking and by-products uses.

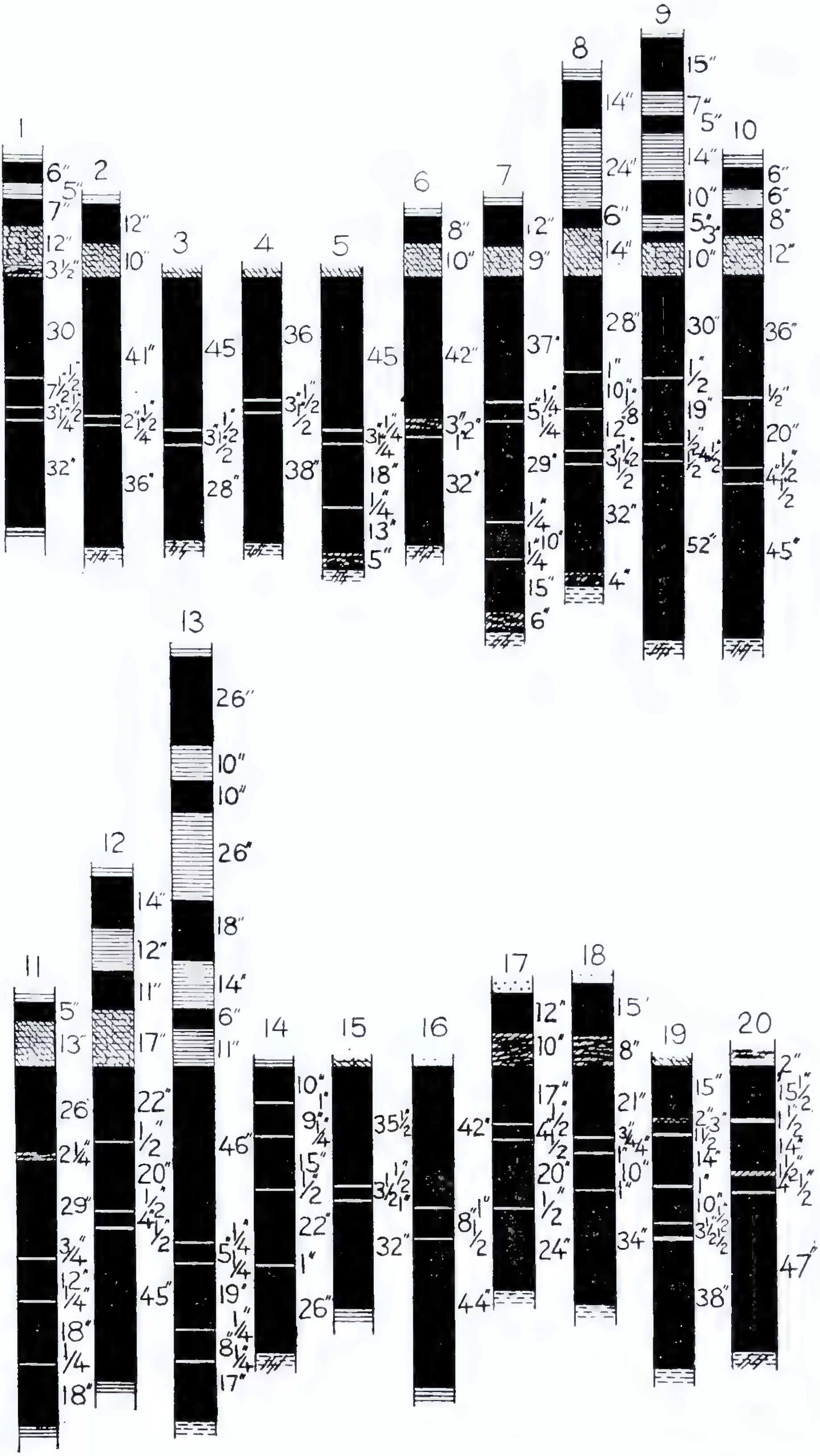


Figure 89. Sections of Pittsburgh coal in Greene County.

1. Pikands Mather Company. Mather No. 1 mine, ¾ mile southwest of Mather Station, Morgan township.
2. Chartiers Southern Coal Company. Edward mine, ½ mile southwest of Clarksville, Jefferson township.
3. Trumbull Coal Company. Wm. Pitt mine, at Besco, Jefferson township.
4. Byetheway Coal Company. Byetheway mine, ¼ mile southeast of Millsboro Station, Jefferson township.
5. H. C. Frick Coke Company. Dilworth mine, at Rices Landing, Jefferson township.
6. Crucible Fuel Company. Crucible mine, ⅕ mile south of Crucible Station, Jefferson township.
7. Buckeye Coal Company. Nemacolin mine, at Nemacolin, Cumberland township.
8. Pittsburgh Steel Company. Alicia No. 2 mine, ½ mile south of Grays Landing, Monongahela township.
9. Warwick Coal Company. Warwick mine, 1 mile north of Greensboro, Monongahela township.
10. Fredericktown Coal and Coke Company. Sandy Run No. 1 mine, ¾ mile northwest of Greensboro, Monongahela township.
11. Vulcan Coal Company. Gabler No. 1 mine, ½ mile northwest of Greensboro, Monongahela township.
12. Penn-Pitt Coal & Coke Company. Rosemary mine, 1 mile southwest of Greensboro, Monongahela township.
13. Seventh Pool Coal & Coke Company. Rose mine, 1¼ miles southwest of Greensboro, Monongahela township.
14. Poland Coal Company. Poland No. 3 mine, 1½ miles west of Lock No. 8, Monongahela township.
15. Mabel Coal Works. Mabel No. 1 mine, 1 mile north of Lock No. 8, Monongahela township.
16. Poland Coal Company. Poland No. 1 mine, 1 mile west of Lock No. 8, Monongahela township.
17. Mapel-Sterling Coal Works. Dunkard No. 2 mine, ¼ mile southwest of Lock No. 8, Dunkard township.
18. Moffitt-Sterling Gas Coal Company. Moffitt mine, 1 mile northwest of Dilliner, Dunkard township.
19. West Point Marion Coal Works. Walnut Hill mine, ½ mile west of Point Marion, Dunkard township.
20. Greene County Coal & Coke Company. Jeannette mine, 1 mile southwest of Point Marion, Dunkard township.

REDSTONE COAL.

The Redstone bed lies 50 feet above the Pittsburgh coal and is persistent in the county but rarely is minable, its average thickness being less than 18 inches. Its horizon is often marked by black shale carrying a few inches of coal. Along Monongahela River the bed is represented by 13 feet of bituminous shale; in the districts back from the river the coal is a few inches thick, and clean.

SEWICKLEY COAL.

The outcrop of the Sewickley coal is confined to the eastern part of the county, where it is mined in the vicinity of Mapletown, the town from which it derives its local name, the Mapletown coal. The coal is thickest and best at Mapletown, where it is divided into three benches of 2 feet 3 inches, 4 inches, and 2 feet 6 inches, parted by clay binders 1 to 2 feet thick. It lies about 120 feet above the Pittsburgh coal. Numerous other localities are discussed in the detailed description.

Although the outcrop of the Sewickley coal is extensive in Greene County, it is of minable thickness only in Monongahela and Dunkard townships. It is open in numerous places for domestic fuel but its only importance as a shipping coal is limited to the area in the vicinity of Mapletown in Monongahela township. In that vicinity the coal has thickened and is the northern end of a thick area which extends southward into the Scott Run district of Monongahela County, West Virginia.

In the vicinity of Grays Landing the coal averages 4 feet 9 inches thick including a shale parting $\frac{1}{8}$ inch thick 6 inches below the top, and a 2-inch bone parting 1 foot 9 inches above the bottom.

In the vicinity of Mapletown and Greensboro the coal is usually 4 feet 3 inches thick including a bone parting $\frac{1}{4}$ to $\frac{1}{2}$ inch thick which is 2 feet $4\frac{1}{2}$ inches to 2 feet 8 inches below the top. Southwest of Greensboro the coal thickens locally to approximately 6 feet, but contains three $\frac{1}{4}$-inch shale partings at various positions in the bed. In the vicinity of Poland Station the bed ranges from 3 feet 11 inches to 6 feet thick, and contains two $\frac{1}{2}$-inch bone or shale partings near the middle.

South of Dunkard Creek the bed averages approximately 6 feet thick, and locally contains only one bone parting $\frac{1}{4}$ inch thick.

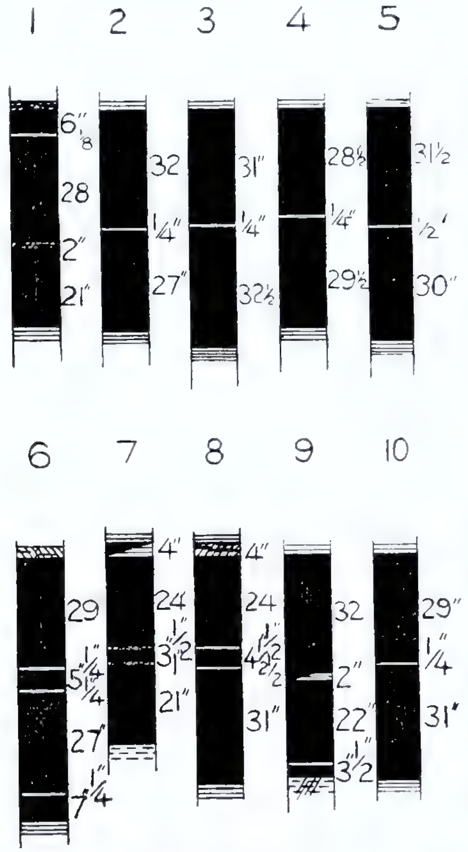


Figure 90. Sections of Sewickley coal in Greene County.

1. Pittsburgh Steel Company. Local mine above Alicia No. 2, ½ mile south of Grays Landing, Monongahela township.
2. Fredericktown Coal & Coke Company. Sandy Run No. 2 mine, 1 mile east of Mapletown, Monongahela township.
3. Greensboro Coal Company. Black's mine, 1¼ miles southwest of Greensboro, Monongahela township.
4. Vulcan Coal Company. Gabler No. 2 mine, ½ mile northwest of Greensboro, Monongahela township.
5. Penn-Pitt Coal & Coke Company. Dora mine, 1 mile southwest of Greensboro, Monongahela township.
6. Seventh Pool Coal & Coke Company. Marie mine, 1½ miles southwest of Greensboro, Monongahela township.
7. Rosedale Coal Company. Rosedale No. 2 mine, ½ mile northwest of Poland Station, Monongahela township.
8. Mabel Coal Works. Mabel No. 3 mine, 1¼ miles north of Lock No. 8, Monongahela township.
9. Mapel-Sterling Coal Works. Dunkard No. 1 mine, ½ mile south of Poland Station, Dunkard township.
10. McGrew & Gapin. Titus mine, 1¼ miles west of Poland on south bank of Dunkard Creek, Dunkard township.

UNIONTOWN COAL.

The Uniontown Coal, lying from 60 to 90 feet below the Waynesburg coal, is not mined because it rarely exceeds 12 inches thick. Its blossom is persistent, but in many places the horizon is marked by bituminous shale.

WAYNESBURG COAL.

The most important bed above the Pittsburgh coal is the Waynesburg. Although it is the main source of domestic fuel in many localities, the quantity mined is small in comparison with the output of Pittsburgh coal in the county. Its position 400 feet above the Pittsburgh coal makes the output more widespread and accessible, for it extends up South Fork of Tenmile Creek toward Waynesburg, up Whiteley Creek, and along Dunkard Creek and Meadow Run. In the eastern part of the county the Waynesburg coal is 5 to 9 feet thick, and in most localities is a double bed. The upper bench ranges from 1 to 3 feet thick and the lower bench is 2 feet 6 inches to 4 feet thick. The benches are separated by a clay and shale parting having a thickness of 3 inches to 2 feet 4 inches. The coal is hard, but contains a high percentage of ash and sulphur.

The Waynesburg A and the Little Washington coals are thin beds which are represented in most localities by a few feet of bituminous shale.

The Waynesburg bed has an extensive outcrop in Greene County. Its only importance is as a source of domestic fuel for farmers and for burning under boilers in the oil and gas fields. Locally it has excellent quality, but the large quantities of refuse in mining prohibit its profitable sale in normal times. Locally it is a thick, clean bed.

In Richhill township the bed ranges from 5 feet to 7 feet 6 inches thick. It contains a shale parting 12 inches to 2 feet thick, 13 inches to 2 feet below the top. The bottom bench is locally separated into two divisions by a shale parting ½ inch thick. Locally the coal is entirely clean but usually contains bone spars and pyrite nodules.

In Franklin township the Waynesburg has an unusual local thickness of 7 feet 8 inches including a shale parting 1 foot 6 inches to 2 feet 2 inches thick approximately 2 feet below the top. The bottom bench, which has no partings, is extensive in large areas, and is usually approximately 4 feet thick. This bench contains bone spars and pyrite nodules. The bed is much thinner and dirty locally, and can not be mined profitably. In addition to the thick shale parting, other shale partings, ranging from 1 to 4 inches thick, are present.

In Morgan township the Waynesburg ranges from a few inches to 8 feet 6 inches thick. Where thickest the bed contains so many thick shale and bone partings that it can not be commercially mined. Where the bed is under 5 feet thick it is usually fairly clean and is divided into two benches by a clay or shale parting 12 inches to 1 foot 8 inches thick. The bottom bench, usually 2 feet 10 inches to 3 feet 4 inches thick, is the best coal. This bench is also rather impure locally due to the presence of large quantities of bone spars and pyrite lenses.

In Jefferson township the maximum thickness of the Waynesburg is 8 feet including two shale and clay partings 6 inches to 16 inches thick. The top bench is usually thin. The middle bench ranges from 18 inches to 2 feet thick. The bottom bench ranges from 2 feet 8 inches to 3 feet 4 inches thick. Locally the bed is divided into two benches by a shale or clay parting ranging from 7 to 16 inches thick. The top bench ranges from 2 to 3 feet thick. The coal in both benches is rather high in ash.

The Waynesburg coal is extremely variable in physical character in Cumberland township. It never exceeds 8 feet thick and averages much less than 4 feet. Usually only one bench of the bed is of minable quality, which is, in most localities, the lower one. This bench ranges from 2 feet 8 inches to 3 feet 4 inches thick. A middle bench, which is fairly persistent in the township, averages 1 foot 10 inches thick, and is separated from the bottom bench by a clay or shale parting 4 to 12 inches thick.

In Monongahela township the maximum thickness of the Waynesburg bed is 7 feet 6 inches including a persistent shale and clay parting near the middle of the bed, and two or three partings of irregular occurrence in the top part of the bed. The lower bench is the only one which can be consistently relied upon to contain coal of merchantable quality. It ranges from 2 feet to 3 feet 4 inches thick. Locally the middle bench, which ranges from 1 foot 10 inches to 3 feet 4 inches thick, is of minable quality, but it usually contains large quantities of bone spars and pyrite nodules. The top bench is usually worthless.

In Greene township the bed is thinner and the middle and bottom benches are separated by a shale parting rarely over 8 inches thick. Both benches can be mined together and commercial coal can be produced from them provided that the coal is carefully picked when mined. The top bench is separated from the middle bench by a shale parting usually 2 to 4 inches thick. The top bench is very impure coal and rarely exceeds 12 inches thick. Locally, in Greene township, the Waynesburg is separated by a shale parting 2 to 4 feet thick. Both the top and bottom benches average 2 feet thick and have fair quality.

In Dunkard township the Waynesburg has a local total thickness of 9 feet. The average thickness is approximately 4 feet. Where thickest, the bed contains a shale parting ranging from 1 foot 10 inches to 3 feet 8 inches thick. The bottom bench is the best coal and ranges from 2 feet 8 inches to 4 feet 6 inches thick. Where thickest it contains rather numerous bone spars near the bottom.

The following sections are typical of the Waynesburg bed in Greene County:

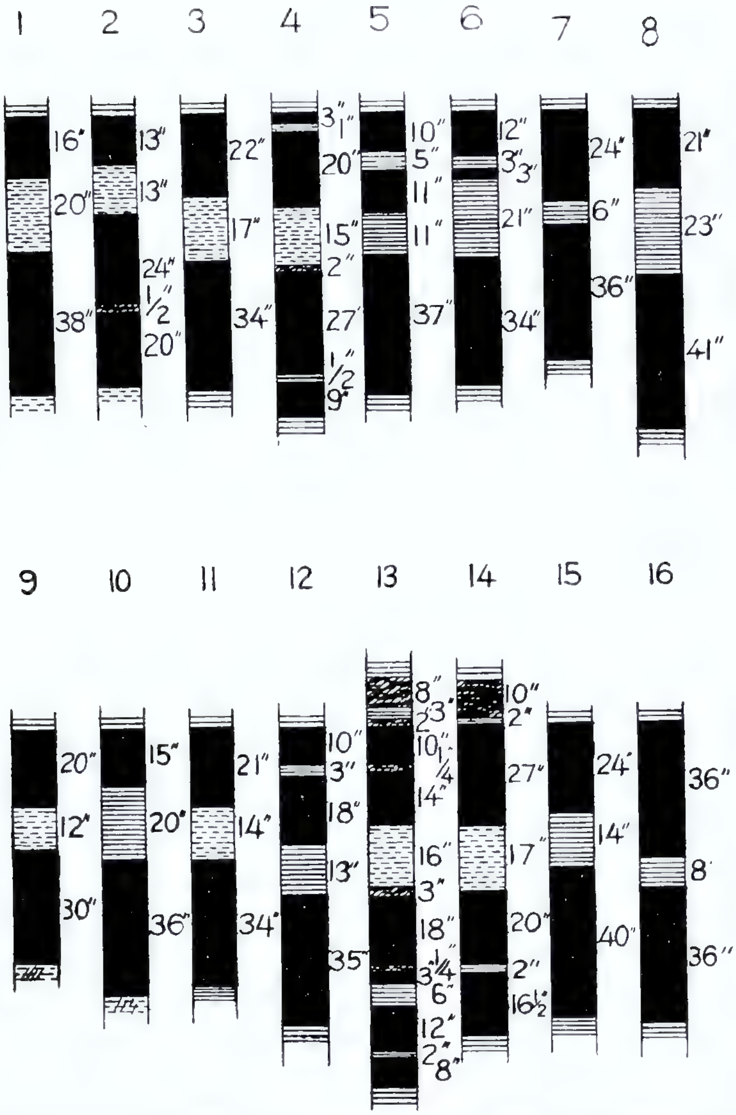


Figure 91. Sections of Waynesburg coal in Greene County.

1. Country bank between Durbin and Crows Mills, Richhill township.
2. Country bank at Durbin, Richhill township.
3. Guthrie Bros. Guthrie mine, 1¼ miles southeast of Waynesburg, Franklin township.
4. A. L. Mordoch. Mordoch mine, 1½ miles southeast of Waynesburg, Franklin township.
5. Outcrop near mouth of Braden Run, Franklin township.
6. Country bank, 2 miles east of Waynesburg, Franklin township.
7. Country bank, 2¼ miles east of Waynesburg, Franklin township.
8. Country bank on Braden Run, Franklin township.
9. Outcrop ¼ mile south of Lippincott, Morgan township.
10. Country bank at Lippincott, Morgan township.
11. Mack Coal Company. Pratt Hill mine, 4 miles northeast of Waynesburg, Morgan township.
12. Country bank on Browns Run, Morgan township.
13. N. P. Rogers country bank, ¾ mile northwest of Jefferson, Morgan township.
14. S. J. Fulton country bank, at Jefferson, Jefferson township.
15. Country bank, 2 miles southwest of Jefferson, Jefferson township.
16. Outcrop, 2 miles northeast of Jefferson, Jefferson township.
17. Country bank at Clarksville, Jefferson township.
18. Dr. Hogg country bank, ½ mile west of Rices Landing, Jefferson township.
19. Outcrop on Pumpkin Run near Jefferson township line.

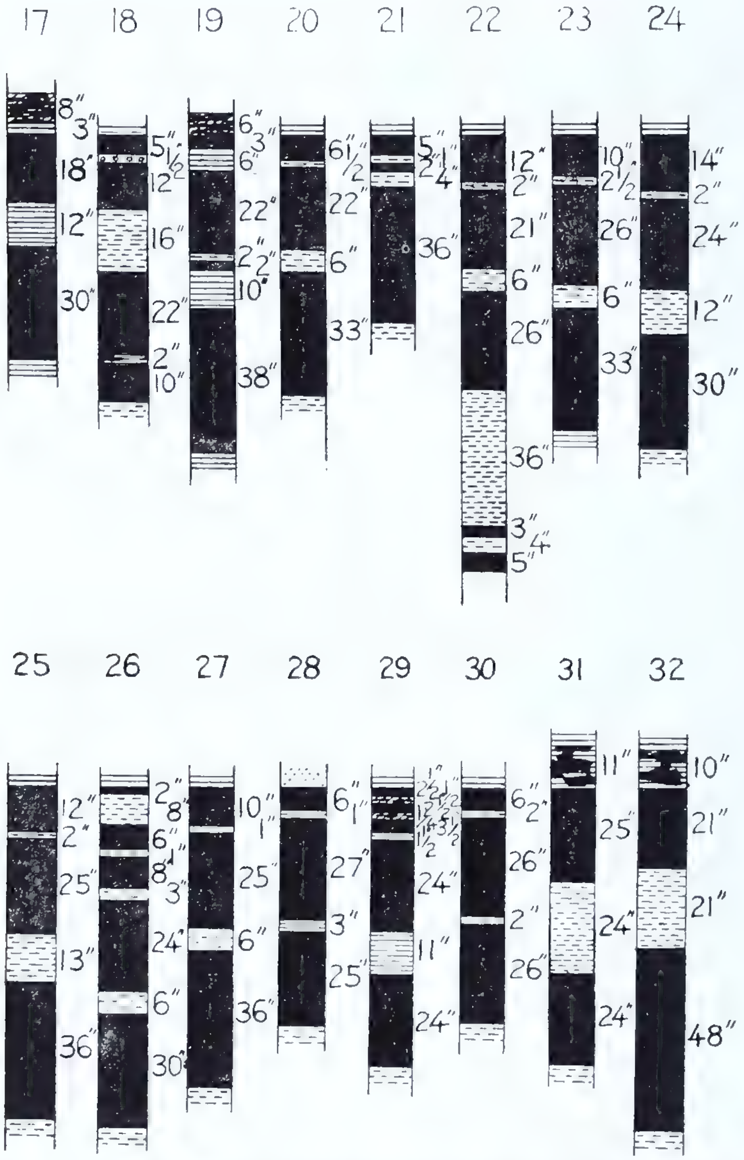


Figure 92. Sections of Waynesburg coal in Greene County.

20. Outcrop at Arensburg Ferry, Cumberland township.
21. Outcrop 1 mile south of Arensburg Ferry, Cumberland township.
22. Outcrop on Muddy Creek, north of Carmichaels, Cumberland township.
23. Outcrop 1 mile east of Carmichaels on Glade Run, Cumberland township.
24. Outcrop at Parkers Bar, Cumberland township.
25. Outcrop on Monongahela River, 1 mile south of Little Whiteley Creek, Monongahela township.
26. Outcrop on Monongahela River, ¼ mile south of Little Whiteley Creek, Monongahela township.
27. Country bank at Ceylon, Monongahela township.
28. Country bank, 1 mile east of Ceylon, Monongahela township.
29. Country bank south of Paisley, Monongahela township.
30. Country bank, 1 mile west of Willow Tree, Greene township.
31. Country bank near Wiley, Greene township.
32. Country bank on Morgantown road, Dunkard township near Greene township line.

WASHINGTON COAL.

The Washington coal is the most persistent of the Dunkard coals and although it has small importance in Greene County where it rarely reaches minable thickness, it is one of the important coals in Washington County. In Greene County it is much swollen by clay and bone partings and is irregular in thickness. In large areas the bed is represented only by bituminous shale. It lies 140 to 180 feet above the Waynesburg coal.

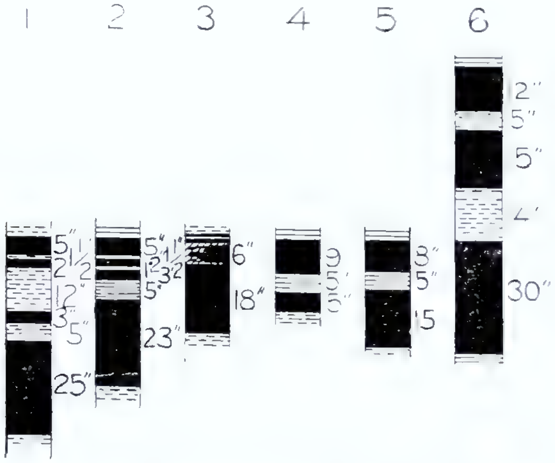


Figure 93. Sections of Washington coal in Greene County.

1. Country bank, 1 mile north of Ryerson Station, Richhill township.
2. Country bank, 1 mile northeast of Ryerson Station, Richhill township.
3. Outcrop 1 mile northwest of Ryerson Station, Richhill township.
4. Outcrop south of Waynesburg, on Smith Creek, Franklin township.
5. Outcrop, at Waynesburg, Franklin township.
6. Outcrop near Rices Landing, Jefferson township.

JOLLYTOWN COAL.

The Jollytown coal is mined locally for domestic use in the Dunkard Creek region where it has a maximum thickness of 1 foot 8 inches. Its average thickness is less than 12 inches. It outcrops in a number of places along the South Fork of Tenmile Creek, on Browns Creek, and on Overflowing Run.

There are several small coals in the upper part of the Greene formation that nowhere exceed a few inches thick and are not mined. They are of geologic interest only and are not described in this publication. They are, in ascending order, the Tenmile, Dunkard, Nineveh, and Windy Gap coals.

CHAPTER XV.

HUNTINGDON-BROAD TOP COAL FIELD.

INTRODUCTION

The Huntingdon-Broad Top coal field lies in the south-central part of the State, in Bedford, Fulton, and Huntingdon counties in a high dissected table-land known as Broad Top Mountain. It is east of the Allegheny Mountains and is totally isolated from the main bituminous coal field of Pennsylvania. The coal is semibituminous. The output of the Broad Top district goes to eastern markets, and is largely consumed for domestic fuel and raising steam in the large cities of the east.

Two railroads serve the Broad Top district. On the west side of the field the Huntingdon and Broad Top Mountain Railroad and Coal Company connects southward at Mount Dallas with the branch of the Pennsylvania Railroad which southward joins the Baltimore and Ohio at Hyndman, and northward joins the main line of the Pennsylvania Railroad at Altoona. The other end of the Huntingdon and Broad Top Railroad leads northward to the main line of the Pennsylvania Railroad at Huntingdon.

On the east side of the coal field the narrow gauge line of the East Broad Top Railroad Company connects northeastward with the main line of the Pennsylvania Railroad at Mount Union, where the coal is transferred to standard gauge cars.

STRUCTURE.

The rocks of the Broad Top field are folded into a series of anticlines and synclines, running in a general northeast-southwest direction and parallel to the larger mountain ridges and valleys of this section of Pennsylvania. In general the folding of the rocks in the Broad Top district is subordinate to the general depression which lies between Tussey Mountain on the west and Jacks Mountain on the east. This same synclinorium continues north and eastward coinciding with the northern anthracite basin. There are two remnants of coal-bearing rocks in this deep fold, both of them resulting from conditions which are essentially similar. This general basin is

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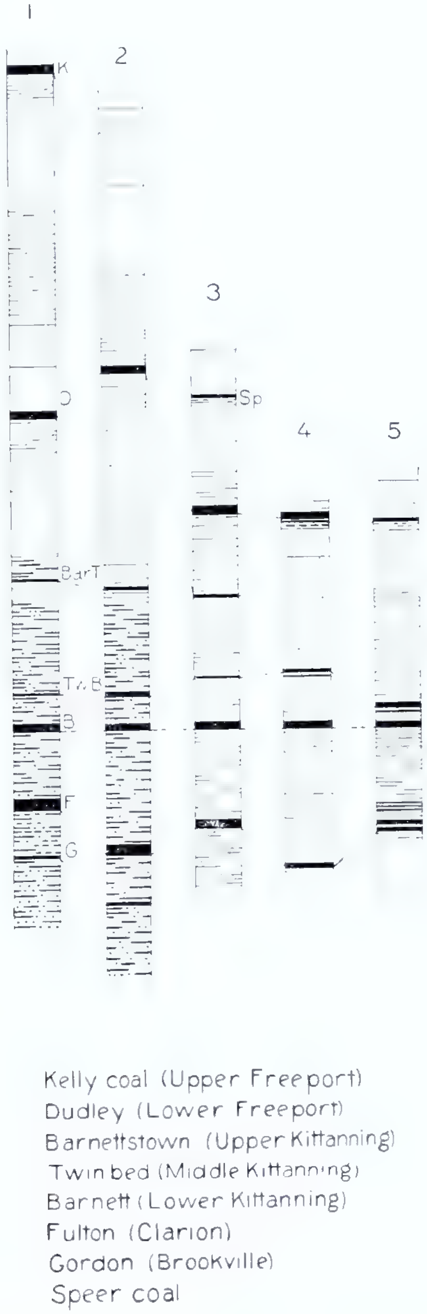
*The information in this chapter, with the exception of the description of the coal beds, is based upon the Topographic and Geologic Survey Commission of Pennsylvania Report No. 10, The Broad Top Coal Field, by James H. Gardner, 1913. The descriptions of the coal beds are based upon data collected by the author.

the deepest in the Appalachian Valley in Pennsylvania. In the Broad Top coal field the rocks dip into the field from all sides, forming a depression similar in shape to a canoe. The rocks have been irregularly eroded at the ends so that the outlines of the field do not correspond with the structure.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Kelly coal (Upper Freeport)
Dudley (Lower Freeport)
Barnettstown (Upper Kittanning)
Twin bed (Middle Kittanning)
Barnett (Lower Kittanning)
Fulton (Clarion)
Gordon (Brookville)
Speer coal

Figure 94. Stratigraphic sections. Broad Top District.

1. Allegheny group, generalized section. Topographic and Geologic Survey Commission of Pennsylvania, Rept. No. 10, 1913, p. 25.
2. Allegheny group on Shoups Run. Topographic and Geologic Survey Commission of Pennsylvania, Rept. No. 10, 1913, pp. 28-29.
3. Generalized section on Six Mile Run. Topographic and Geologic Survey Commission of Pennsylvania, Rept. No. 10, 1913, p. 31.
4. Generalized section on Sandy Run. Topographic and Geologic Survey Commission of Pennsylvania, Rept. No. 10, 1913, p. 33.
5. Generalized section in the East Broad Top basin. Topographic and Geologic Survey Commission of Pennsylvania, Rept. No. 10, 1913, p. 36.

STRATIGRAPHY.

The coal-bearing rocks of the Broad Top field are the Conemaugh and Allegheny groups, and the Pottsville series. The Conemaugh group consists of sandstone, shale, and thin beds of coal. The Allegheny is the chief coal-bearing group of this area, and between each of the coals are shales and sandstones with local occurrences of thin limestones.

The Pottsville contains only local thin coal beds which are not being mined.

COALS.

Three coal beds are mined in the Broad Top field, in ascending order, the Fulton, Barnett, and Kelly. These coals are coking in character, the Fulton and Kelly being better than the Barnett.

The first authentic record of coal mining in the Broad Top field states that Tories not desiring to fight against England in the Revolutionary War took up their abode in this district, and mined the coal for their homes. The first commercial shipments were made in 1853. Production increased and reached its peak in 1918.

Generalized section of coal beds in Huntingdon-Broad Top District.

Group	Name of bed	Average interval	Average thickness of the beds Ft.	in.
Conemaugh 530	Roger		4	0
	No merchantable coal			
Allegheny 375	Kelly (Upper Freeport)		4	0
		150		
	Dudley (Lower Freeport)		5	0
		61		
	Barnettstown (Upper Kittanning?)		1	6
		50		
	Twin Bed (Middle Kittanning?)		1	0
		12		
	Barnett (Lower Kittanning?)		3	0
		30		
	Fulton (Clarion)		5	0
		20		
	Gordon (Brookville)		1	0
		30		
Pottsville	No merchantable coal			

POTTSVILLE COALS.

One or two coal horizons in the Pottsville series have been found in the Broad Top district. These horizons are generally marked by a few feet of bituminous shale and impure coal. These beds have no value. Farmers have made unsuccessful attempts to open them for local use.

GORDON (BROOKVILLE, A) COAL.

The Gordon coal, at the base of the Allegheny group, is extremely irregular in thickness and quality in the district. It has been mined at one or two places by farmers for local use, but rarely averages over 12 inches thick. It will probably never have commercial value.

FULTON (CLARION, A′) COAL.

The Fulton bed, lying 20 feet above the Gordon, ranges from 3 to 5 feet thick, and usually contains at least one parting of bituminous shale. The Fulton bed has been mined extensively on Shoups Run, and in the East Broad Top basin. Its development is just beginning in the southern part of the field. The Fulton probably is persistent throughout the district. Locally the bed contains an appreciable amount of shale, which makes its future commercial value doubtful unless the coal is carefully cleaned. This condition is particularly true of areas on Six Mile, Sandy, and Kimber runs. On Broad Top anticline and in the Trough Creek or East Broad Top basin it is probably a very valuable bed.

The Fulton is a semibituminous coal. The average section is as follows: shale; coal, 2 feet 4 inches; shale, 3 feet 11 inches; coal, 18 inches to 1 foot 10 inches; shale, 2 inches; coal, 12 inches; bottom, clay. This bottom coal is not persistent in the entire field, and is often so thin that only the upper benches are mined. At the extreme eastern end of the field the whole bed pinches until it is not workable.

In Todd township, Huntingdon County, the Fulton ranges from 4 feet 2 inches to 6 feet 10 inches thick. Locally it occurs in a single bench, but it is usually separated near the top by a sandstone or shale parting 4 to 6 inches thick. In Carbon township the physical character is extremely variable. It is thickest in the vicinity of Coalmont, averaging 7 feet 8 inches thick including two sandstone partings 6 and 8 inches thick. The top bench of coal is 2 feet thick, the middle bench 2 feet 6 inches, and the bottom bench 1 foot 10 inches. Where mined the bed averages 4 feet thick.

The Fulton is being mined extensively in Wood township, Huntingdon County. It occurs in two benches separated by a shale parting 2 inches to 2 feet 3 inches thick. The top bench ranges from 2 feet to 2 feet 10 inches thick, and the bottom bench from 12 to 18 inches thick.

In Wells township, Fulton County, the coal is locally thicker and averages 5 feet 8 inches thick including two 5-inch shale partings at various intervals in the bed.

The Fulton is mined only in Broad Top township in Bedford County. Its thickness is extremely variable, but it is usually over 3 feet 10 inches including one or more shale partings of variable thickness.

The following sections are typical of the Fulton bed in the Huntingdon-Broad Top field:

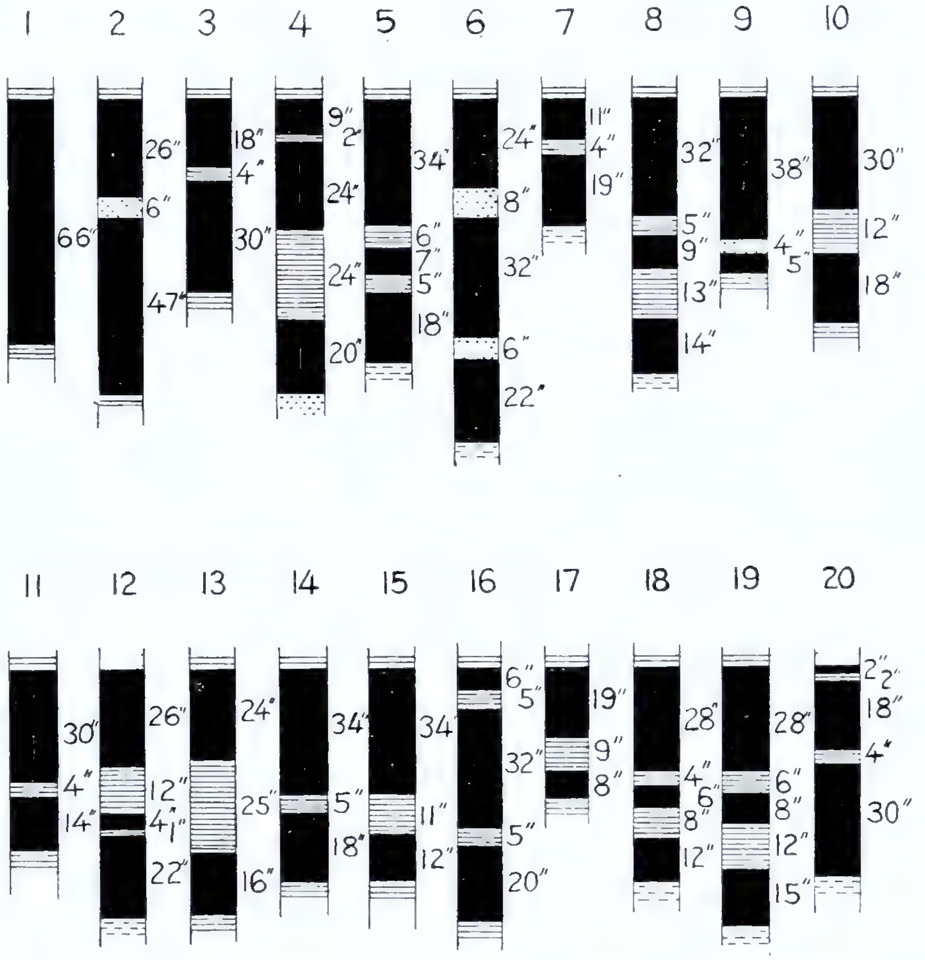


Figure 95. Sections of Fulton bed in Broad Top Coal Field.

1. Jacobs mine, ¾ mile northwest of Jacobs, Todd township, Huntingdon County.
2. Wrays Hill mine, ¾ mile northeast of Cooks, Todd township, Huntingdon County.
3. Possum Hollow mine, 1 mile northeast of Cooks, Todd township, Huntingdon County.
4. Miller mine, ½ mile northwest of Melrose, Carbon township, Huntingdon County.
5. Kenrock Coal Company. Franklin No. 1 mine, 2½ miles east of Coalmont, on north bank of Miller Run, Carbon township, Huntingdon County.
6. Joseph E. Thropp. Gordon mine, on Shoups Run, 1 mile northwest of Coalmont, Carbon township, Huntingdon County.
7. Full Bar Mining Company. Full Bar mine, ¾ mile north of Dudley on west bank of Shoups Run, Carbon township, Huntingdon County.
8. W. W. Reed. Midlothian mine, in Dudley borough, Huntingdon County.
9. Shannon Company. Ocean No. 5 mine, 1¼ miles east of Dudley on south bank of Shoups Run, Carbon township, Huntingdon County.
10. A. J. Black Coal Company. Black No. 3 mine, ¼ mile northwest of Broad Top City, Carbon township, Huntingdon County.
11. J. H. Neville. Neville No. 1 mine, at Broad Top City, Carbon township, Huntingdon County.
12. J. H. Neville. Neville No. 4 mine, ½ mile north of Broad Top City, on west bank of Shoups Run, Carbon township, Huntingdon County.
13. Rockhill Coal & Iron Company. Rockhill No. 1 mine, at Robertsdale, Wood township, Huntingdon County.
14. Rockhill Coal & Iron Company. Rockhill No. 5 mine, at Robertsdale, Wood township, Huntingdon County.

15. Rockhill Coal & Iron Company. Rockhill No. 6 mine, at Wood, Wood township, Huntingdon County.
16. Rockhill Coal & Iron Company. Rockhill No. 9 mine, 2 miles south of Wood on East Broad Top Railroad, Wells township, Fulton County.
17. Glendale mine, at Glendale, Broad Top township, Bedford County.
18. Louise Coal Company. Louise mine, 1½ miles southeast of Coalmont, Broad Top township, Bedford County.
19. Baylor Coal Mining Company. Coalmont mine, 2 miles south of Coalmont, on south bank of small tributary run of Shoups Run, Broad Top township, Bedford County.
20. Schipper Bros. Coal Mining Company. Ladysmith No. 5 mine, ¾ mile east of Coaldale borough, Broad Top township, Bedford County.

Barnett (Lower Kittanning, B) Coal.

The Barnett coal, lying approximately 50 feet above the Gordon, ranges from 3 to 4 feet thick. It is usually free from large partings, and is a persistent bed. It usually has 4 to 6 inches of bone at the top, and is frequently divided into numerous benches by thin bone or shale partings. The Barnett bed, like the Fulton, has been mined more extensively on Shoups Run and in the East Broad Top basin than elsewhere. It is mined to some extent on Sixmile, Long, and Sandy runs.

In Todd township, Huntingdon County, the Barnett usually occurs in a single bed, ranging from 2 feet 4 inches to 3 feet 2 inches thick. One of the principal mining districts of the Barnett bed is in Carbon township, Huntingdon County. The bed occurs in a single bench averaging 2 feet 8 inches thick, with the exception of one locality on Shoups Run, another at Kutztown, and locally at Broad Top City where the bed is separated into two benches by a shaly sandstone, ranging from 2 feet 6 inches to 10 feet thick. At these localities the top bench ranges from 12 inches to 2 feet 6 inches thick; the bottom bench ranges from 6 inches to 3 feet 2 inches thick.

The Barnett is mined at many localities in Broad Top township, Bedford County. It is almost without exception a single bench ranging from 2 feet 3 inches to 3 feet thick, and has a persistent average thickness of 2 feet 8 inches. The main bed is usually overlain by bone coal. The bottom is shale.

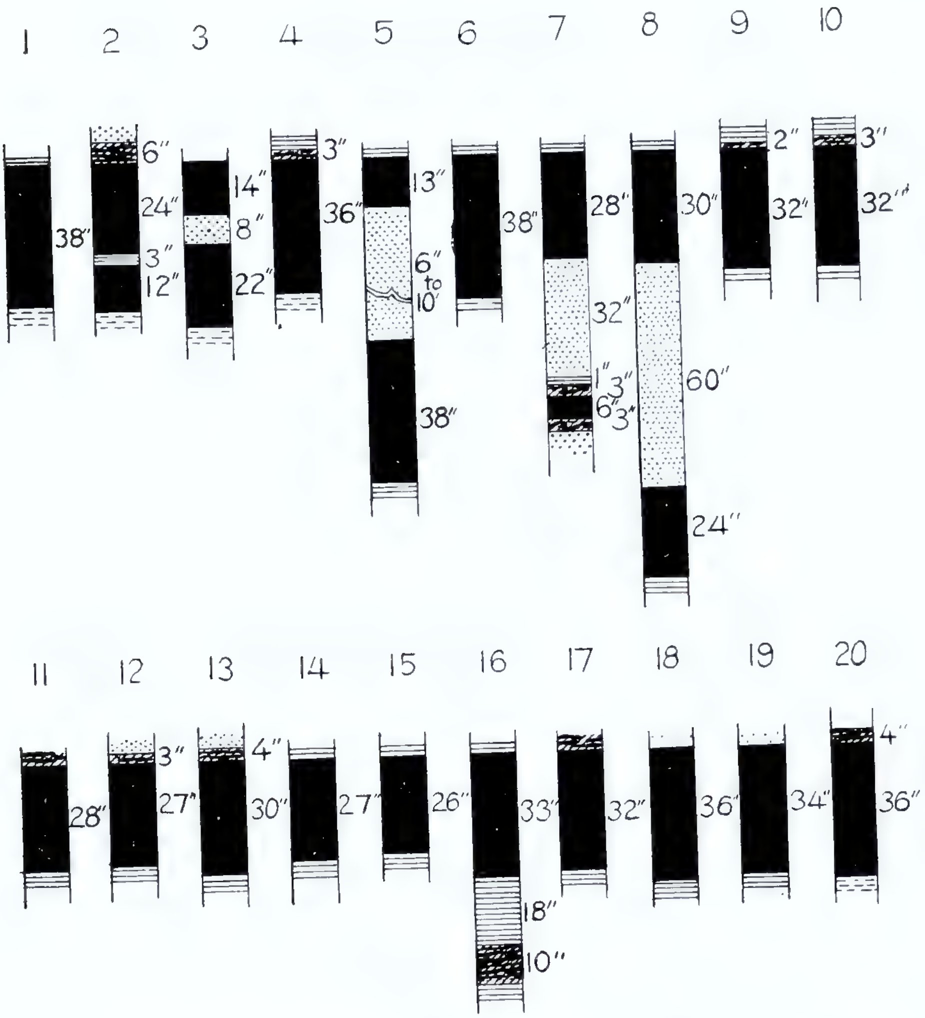


Figure 96. Sections of Barnett bed in the Broad Top Coal Field.

1. J. H. Miller. Joller mine, 2½ miles southeast of Coles Summit, on East Broad Top Railroad, Todd township, Huntingdon County.
2. Kenrock Coal Company. Franklin No. 2 mine, 2¾ miles east of Coalmont on north bank of Miller Run, Carbon township, Huntingdon County.
3. J. E. Thropp. Melrose Nos. 1 and 2 mines, on north bank of Shoups Run, 2 miles southeast of Coalmont, Carbon township, Huntingdon County.
4. Reed Coal Mining Company. Benedict mine, 1 mile northeast of Dudley on west bank of small tributary of Shoups Run, Carbon township, Huntingdon County.
5. Shannon Company. Ocean No. 5 mine, 1½ miles east of Dudley on south bank of Shoups Run, Carbon township, Huntingdon County.
6. Shannon Company. Carbon No. 5 mine, 3 miles northeast of Dudley on south bank of Shoups Run, Carbon township, Huntingdon County.
7. Moredale mine, ¼ mile south of Cookstown, Carbon township, Huntingdon County.
8. Fisher mine, ¼ mile west of Broad Top City, Carbon township, Huntingdon County.
9. J. H. Neville. Neville No. 1 mine, ½ mile north of Broad Top City, on north bank of Shoups Run, Carbon township, Huntingdon County.
10. A. J. Black Coal Company. Black No. 2 mine, in North Broad Top City, on south bank of Shoups Run, Carbon township, Huntingdon County.
11. Shanil Coal Company. Shanil Nos. 1 & 2 mines, ½ mile east of Riddlesburg on north bank of Six Mile Run, Broad Top township, Bedford County.
12. Kay Coal Company. Tussey Nos. 2 & 3 mines, ¾ mile east of Riddlesburg on north bank of Six Mile Run, Broad Top township, Bedford County.

13. E. Eichelberger & Company. Bacon No. 2 mine, 1 mile east of Six Mile Run town on south bank of Six Mile Run, Broad Top township, Bedford County.
14. Illinois mine, at Coaldale, Broad Top township, Bedford County.
15. Bartle mine, ¼ mile south of North Point, Broad Top township, Bedford County.
16. James M. McIntyre & Company. Shreeve Run No. 2 mine, 2 miles southeast of Coaldale borough on east bank of Shreeve Run, Broadtop township, Bedford County.
17. J. E. Thropp. Barnett Nos. 2 and 3 mines, in vicinity of Kearney, 4 miles northeast of Hopewell, north bank of Longs Run, Broad Top township, Bedford County.
18. Langdon Coal Company. Cambria No. 1 mine, in vicinity of Kearney, 3½ miles east of Hopewell, Broad Top township, Bedford County.
19. Langdon Coal Company. Glendale No. 1 mine, 4 miles east of Hopewell in vicinity of Kearney, Broad Top township, Bedford County.
20. Peoples Fuel and Supply Company. Leonore No. 5 mine, on west bank of Shermans Run, in vicinity of Sandy Run town, Broad Top township, Bedford County.

TWIN BED.

The Twin bed, occurring about 12 feet above the Barnett, is thin and without commercial importance. It is doubtful if any area will be found where this bed can be profitably mined. It is usually a solid, clean coal, but rarely 2 feet thick. Should any merchantable area of this coal be found and the Barnett mined out beneath it, the bed will be entirely ruined, unless sufficient time is given the intervening strata to settle after pillars have been pulled cleanly in the lower bed.

BARNETTSTOWN BED.

The Barnettstown bed, lying 50 feet above the Twin bed, usually occurs in two or more benches separated by several feet of shale. The usual thickness of the upper bench is 18 inches, and the lower 16 inches. These beds will probably never be mined because of their extreme variability in thickness.

DUDLEY (LOWER FREEPORT ?, D) COAL.

The Dudley coal bed, lying about 61 feet above the Barnettstown, has been opened at a few localities for local use. There are no commercial mines in this bed because it is extremely dirty and impure. It averages about 5 feet thick, and consists of alternating bands of bone coal, shale, and coal.

KELLY (UPPER FREEPORT, E) COAL.

The Kelly bed, lying 150 feet above the Dudley, and 270 feet above the Barnett, has been mined extensively on Six Mile, Long, and Sandy runs. It ranges from 3 to 5 feet thick, averaging 4 feet. A large quantity of coal has been mined from this bed because of its easy accessibility. Undoubtedly much recoverable coal still remains in this bed.

The Kelly occurs in many localities as a single bed; in others it occurs in two benches separated by a shale parting having a maximum thickness of 16 inches but averaging less than 4 inches. All of the commercial mines working this coal in 1924 were in Broad Top township, Bedford County.

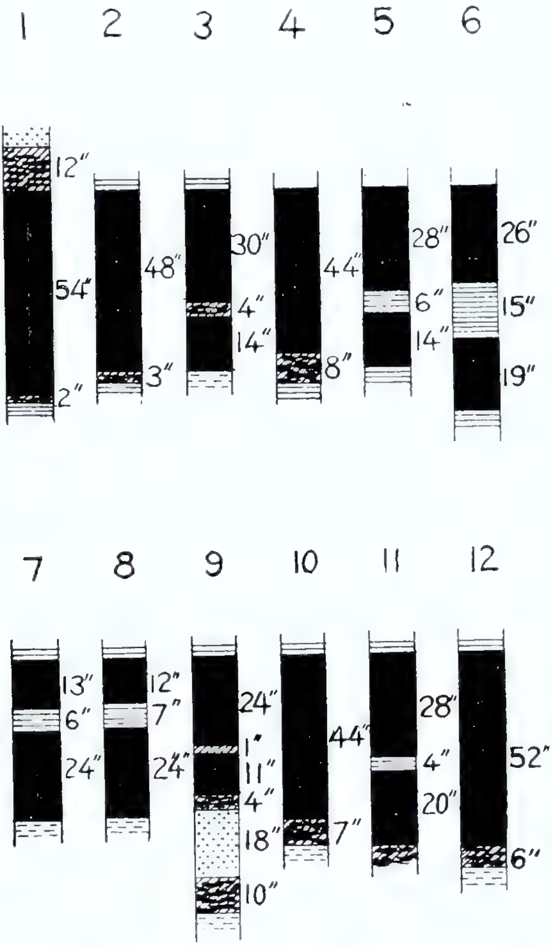


Figure 97. Sections of the Kelly bed in the Broad Top Coal Field.

1. Penn Central Power Company. Penn Central No. 1 mine, 2¾ miles south of Coalmont on east bank of a stream entering Shoupes Run at Coalmont, Broad Top township, Bedford County.
2. Kay Coal Mining Company. Tussey No. 1 mine, ½ mile east of Riddlesburg on north bank of Six Mile Run, Broad Top township, Bedford County.
3. Colonial Iron Company. Judith No. 1 mine, ¾ mile east of Riddlesburg on south bank of Six Mile Run, Broad Top township, Bedford County.
4. Colonial Iron Company. Judith No. 4 mine, 1½ miles east of Riddlesburg on north bank of Six Mile Run, Broad Top township, Bedford County.
5. Schipper Brothers Coal Mining Company. Ladysmith No. 3 and 4 mines, at Six Mile Run town, Broad Top township, Bedford County.
6. Schipper Brothers Coal Mining Company. Smokeless mine, on Six Mile Run 1½ miles east of Six Mile Run town, Broad Top township, Bedford County.
7. Broad Top Coal Company. Delaware No. 5 mine, 2 miles east of Coaldale borough on north bank of Six Mile Run, Broad Top township, Bedford County.
8. Broad Top Coal Company. Delaware No. 6 mine, 2½ miles northeast of Coaldale on east bank of a small tributary of Six mile Run, Broad Top township, Bedford Coutny.

9. James M. McIntyre & Company. Shreeve Run No. 6 mine, 2 miles east of Coaldale borough on south bank of Six Mile Run, Broad Top township, Bedford County.
10. Langdon Coal Company. Chevington No. 4 mine, 2½ miles east of Hopewell, Broad Top township, Bedford County.
11. J. E. Thropp. Kelly No. 4 mine, on Long Run 4 miles east of Hopewell, Broad Top township, Bedford County.
12. J. E. Thropp. Buffalo mine, 4 miles east of Hopewell, Broad Top township, Bedford County.

Conemaugh Coals.

The Speer coal bed, which lies approximately 50 feet above the Kelly, is persistent but averages less than 18 inches thick. On the lower part of Six Mile Run it has a local thickness of 3 feet, but is impure.

A local bed known as the Phipps, lies approximately 30 feet above the Speer. It has an abnormal maximum thickness of 2 feet 4 inches in Mosquito Hollow. Its average thickness throughout this district is less than 12 inches.

A coal described by Gardner in the report of the Topographic and Geologic Commission locally occurs in McCue basin. It has been opened locally and ranges from 1 to 3 feet thick. It is exceedingly variable in thickness.

The Rogers coal bed occurs at five points in the high knobs of the Broadtop coal field. Former correlations of the Rogers with the Pittsburgh are rather doubtful because its interval is only 500 feet above the Kelly, which is presumed to be the Upper Freeport. In Somerset County this interval averages 875 feet. The evidence that the Conemaugh group thickens eastward is conclusive. It is extremely doubtful that the Conemaugh would again thin to 500 feet in Bedford County.

CHAPTER XVI.

INDIANA COUNTY

INTRODUCTION

Indiana County for many years has been one of the most important bituminous coal-producing counties in Pennsylvania. The greater part of the coal is mined from the Upper Freeport bed, which is the largest reserve of valuable and easily accessible coal in the county. The Lower Kittanning, Lower Freeport, and the Pittsburgh beds are important locally as sources of shipping coal. Many other beds have future value, but are not mined at present.

The thick coal beds of the Allegheny group, including the Kittannings and Freeports, are large reserves for future use. Practically all mining as yet is by drifts, although there are extensive areas where these beds are within easy shafting distance. The Pittsburgh bed, restricted to a small area in the southwestern part of the county, will be exhausted within a few years.

Transportation facilities are ample. The Pennsylvania Railroad follows Conemaugh River along the entire southern boundary of the county. A branch line runs north from Blairsville to Indiana and east from Black Lick into Cambria County. The New York Central and Pennsylvania railroads serve the numerous mines between Cherry Tree, Clymer, and Heilwood, and also the Glen Campbell field in the northeastern part of the county. The Buffalo, Rochester and Pittsburgh Railroad enters the county at Blaisdell Junction, serves the Rossiter field, runs southwest through Juneau, Savan, Marion Center, Home Creekside, Shelocta, and Parkwood, and terminates at Iselin. A branch line serves the Jacksonville and Kent area; and another runs south from Creekside, through Indiana to Black Lick. This railroad uses the Pennsylvania tracks on Black Lick Creek between Black Lick and Vintondale. The main line of the Buffalo, Rochester and Pittsburgh Railroad crosses the northwestern part of the county along Mahoning Creek. The New York Central has a branch line to Rossiter. The Buffalo and Susquehanna Railroad runs southwest from Juneau, and terminates at Sagamore.

Indiana County has many miles of good roads, most of which are dirt. They are used extensively for transportation of coal for local use. During times of excessive prices they are also used for hauling coal to sidings.

Chestnut Ridge is the most pronounced topographic feature of Indiana County. It is a narrow highland belt, the distance from valley to valley on either side being only about five miles. The ridge is less prominent than farther south; its dissected crest is composed of knobs ranging from 1700 to 1900 feet in elevation. West of Chestnut Ridge the topography is less rugged, or gently undulating, and is marked by low, rounded hills. The county is in the Appalachian plateau. The greater part of this upland region is characterized by softly rounded outlines and gentle slopes. The level areas are few and small.

STRUCTURE.

There are fifteen structure features in the county, each having a general northeast-southwest trend. Chestnut Ridge anticline is the most pronounced of these. Most of the others are minor.

The steep western slope of Laurel Hill anticline, which brings the Catskill series to outcrop, crosses the extreme southeastern tip of the county.

Barnesboro syncline, lying northwest of Laurel Hill anticline, crosses Conemaugh River near New Florence, passes through Wehrum, and leaves the county one-half mile south of Nipon, Cambria County. It is a broad shallow basin, with the rocks rising gently northwest to Nolo anticline.

Nolo anticline enters Indiana County near New Florence, extends northeast near Croft, Strongstown, and Pineton, and leaves the county two miles west of Barnesboro, Cambria County. It is a rather sharp fold, having local dips of five degrees. The dips are greater on the western slope. The axis rises gently to Pineton, and runs nearly level from that point to the eastern edge of the county.

Brush Valley syncline, the next structure to the northwest, has its southern end in Indiana County, between Nolo and Chestnut Ridge anticlines. It extends northeast near Brush Valley and Cookport, leaving the county about two miles north of Cherry Tree. It is a broad fold, with rather steep dips on both flanks. The axis is extremely irregular in elevation.

Chestnut Ridge anticline, the largest fold in the county, crosses Conemaugh River about 2 miles west of Bolivar, and extends northeast near Penn Run (Greenville), Utah (Taylorville), and Hortens, leaving the county near the northeast corner. The west slope of the anticline is generally steepest; the fold is highest between Blacklick Creek and Conemaugh River. The northern part of the fold in Indiana County is broad and flat, and the axis is extremely variable in elevation.

Latrobe syncline enters the county at Blairsville, extends northeast near Homer City, and flattens out at Indiana. It is a well marked structure, with the rocks rising rapidly on the eastern flank, and gently on the western. The axis is very regular in elevation.

Dixonville syncline is a minor structure lying between Chestnut Ridge anticline and Richmond anticline near Dixonville. The basin is narrow and flat. The greatest rise of the rocks is on the eastern flank.

Richmond anticline is a short structure lying near Kintersburg and Rayne. The dips on both flanks are gentle. The axis rises sharply to the north.

Jacksonville anticline crosses the Conemaugh near Saltsburg, and extends northeast to Curry Run where it flattens out. It is a well defined structure with a broad flat top, and gentle dips on both flanks.

McKee Run anticline is a low gentle fold lying between Indiana and Creekside. This anticline is important because of the occurrence of gas along its northwest flank in the vicinity of Creekside.

Elders Ridge syncline enters the county at Edri, extends northeast near Elders Ridge, West Lebanon, and Chambersville, and flattens out in the northern part of the county. It is a canoe-shaped basin, shallow at both ends but deepening toward the middle at Iselin. The slopes on both flanks are rather steep but remarkably uniform.

Dutch Run anticline is a minor fold of small extent, lying just west of Willett.

Punxsutawney syncline, Perrysville and Roaring Run anticlines lie in the northwestern corner of the county, but their exact locations have not been determined by the Geological Survey. They are minor structures.

STRATIGRAPHY.

The outcropping rocks of Indiana County belong to the Quaternary and Carboniferous systems. The Quaternary system is represented by river deposits of recent age; the Carboniferous by the Monongahela, Conemaugh and Allegheny groups and the Pottsville, Mauch Chunk and Pocono series.

The flood plains of the streams are deposits of alluvium—gravel, sand and silt—particles of disintegrated rock which have been washed down from the hillsides and deposited in their present positions in times of high water.

The Monongahela group is present only in the highlands on the southwestern border of the county. The upper part has been eroded, leaving about 220 feet of rocks intact above the Pittsburgh coal, consisting chiefly of sandstone and calcareous shale, but including two limestones and two workable coal beds.

The Conemaugh group is about 650 feet thick, and consists of shales of various colors, interstratified with beds of coarse sandstone, a few thin limestones, and several coal beds, some of which have considerable economic importance.

The Allegheny group is about 295 feet thick and is composed of massive sandstone and several beds of limestone and fireclay. It contains many coal beds, four of which are locally valuable. This group underlies practically all of the county.

The Pottsville series is about 109 feet thick, and is composed of two beds of sandstone, separated by shale which in some places carries one or more unimportant coal beds. Its outcrop is limited.

The Mauch Chunk series is composed entirely of shale with thin lenses of sandstone interbedded in it. Its outcrop is limited to a few valleys where streams have cut across anticlines.

The Pocono group is composed of greyish-green sandy shale and sandstones, with several bands of red shale, and has a thickness of about 1050 feet. It is not coal bearing.

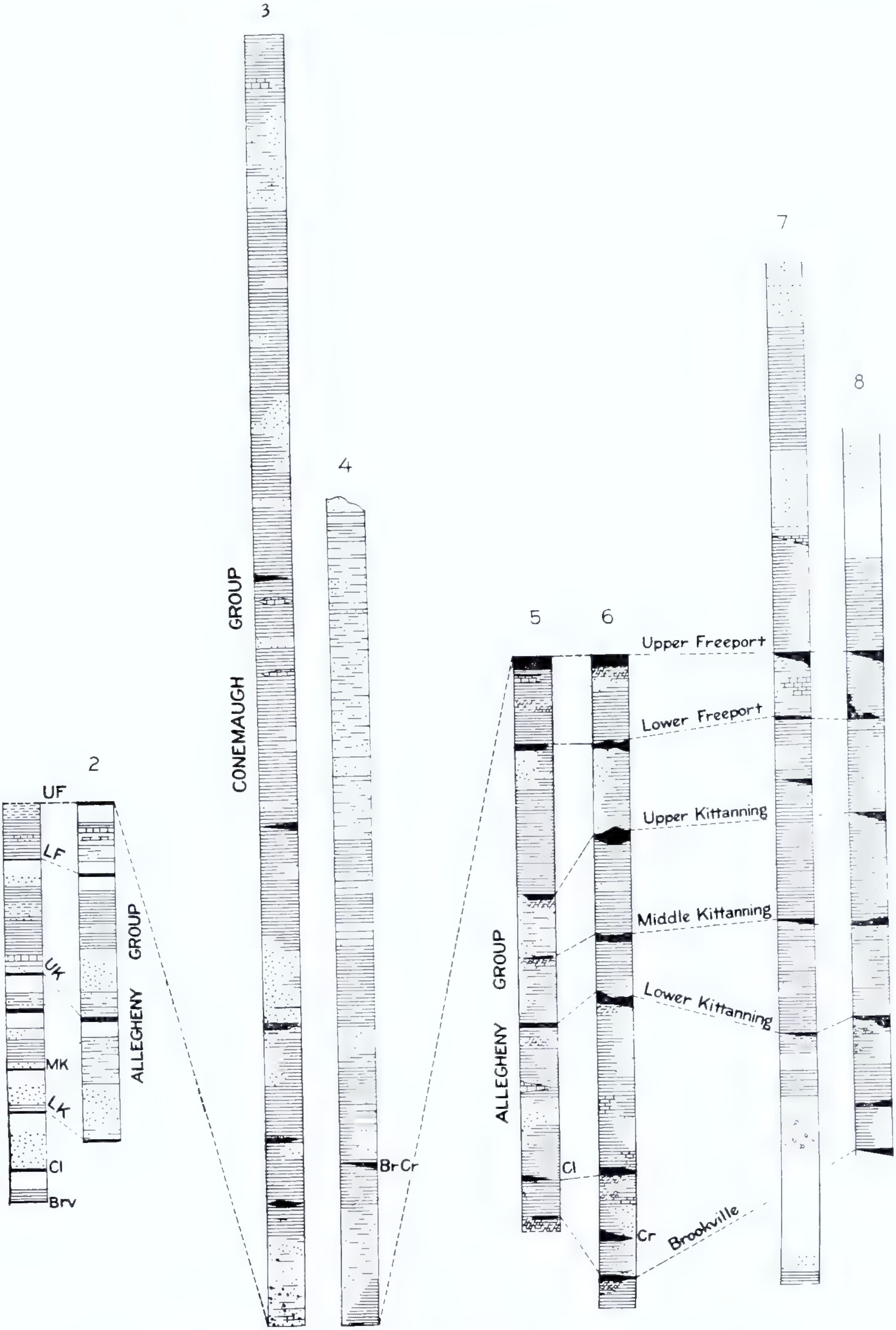


Figure 98. Stratigraphic sections. Indiana County.

1. Drill hole 2¼ miles northwest of Purchase Line. U. S. G. S. Barnesboro-Patton Folio, p. 4.
2. Drill hole 1 mile southeast of Pine Flats. U. S. G. S. Barnesboro-Patton Folio, p. 4.
3. Generalized section Conemaugh group. U. S. G. S. Indiana Folio.
4. Generalized section Conemaugh group. U. S. G. S. Rural Valley Folio.
5. Generalized section Allegheny group. U. S. G. S. Indiana Folio.
6. Generalized section Allegheny group. U. S. G. S. Rural Valley Folio.
7. Section south of Rossiter, Canoe township.
8. Section north of Glen Campbell, Banks township.

COALS.

The following table shows the stratigraphic relation of the beds and their range in thickness.

Coal beds in Indiana County.

Group.	Name of bed	Average interval	Range in thickness of coal beds			
			Ft.	in	Ft.	in.
Monongahela	Sewickley		0	6	5	0
		80				
	Redstone		0	6	3	0
		45				
	Pittsburgh		6	0	10	0
		400-425				
Conemaugh 650	Coal		0	0	2	0
		70-100				
	Coal		0	0	1	8
		40-60				
	Coal		0	0	2	0
		50-75				
Allegheny 295	Upper Freeport (E)		1	0	7	0
		25-80				
	Lower Freeport (D)		0	6	16	0
		40-80				
	Upper Kittanning (C′)		0	6	5	0
		30-50				
	Middle Kittanning (C)		0	0	2	0
		35-70				
	Lower Kittanning (B)		0	0	5	0
		50-85				
	Clarion (A′)		0	0	1	0
		20-55				
	Brookville (A)		0	0	4	0

The coals in the Mercer group in the Pottsville series are not minable in Indiana County. On Blacklick Creek, a coal in the Pottsville series is locally 14 inches thick, but appears to be very lenticular.

BROOKVILLE (A) COAL.

The Brookville coal, lying a few feet above the Pottsville sandstone and in the Allegheny group, is generally very impure, high in sulphur, and varies greatly in thickness. At Old Conemaugh Furnace it is 4 feet thick, and at Bolivar, ten miles down the Conemaugh, only 18 inches. On Blacklick Creek at Heshbon and Bells Mills it is between 3 and 4 feet thick, and has been used for steaming purposes and for burning brick. It is extremely high in ash and sulphur. In Pine township it ranges from 2 feet 2 inches to 3 feet 10 inches thick.

CLARION (A′) COAL.

The Clarion, lying 20 to 55 feet above the Brookville, is thin, but very persistent in the county. It averages 6 inches thick.

LOWER KITTANNING (B) COAL.

The Lower Kittanning coal is about 190 feet above the Pottsville sandstone, and 190 feet below the Upper Freeport coal. It is below drainage practically everywhere in the county, and few openings have been made in it. The bed does not average more than 2 feet in the entire county, although in local areas it has a maximum thickness of 5 feet. It generally has 3 to 4 inches of bony coal at the top. Its floor is fire clay and is persistently rolly. The shale roof is always regular. There are no persistent partings or binders, although locally there is a thick clay parting near the center of the bed. Local lenses of pyrite are common.

The Lower Kittanning is important on Conemaugh River and on Blacklick Creek. It averages 2 feet 10 inches thick at Boltz, and locally thickens to 3 feet 2 inches, and has 5 inches of bone on top. It is 3 feet 2 inches thick in Robindale shaft, where it is mined for use in the West Penn power plant; 4 inches of top coal are locally bony. The bed is 5 feet 3 inches thick at Lockport, including a 3-inch parting of bone and shale 18 inches from the bottom, and 6 inches of bone coal at the top. It is very high in sulphur, made so by numerous lenses of pyrite. The Lower Kittanning coal is mined extensively at Robinson (Bolivar), where it ranges from 3 feet 6 inches to 5 feet thick. It carries a few inches of bone coal on top. A local binder from 1 to 6 inches thick is sometimes present 18 inches above the bottom. The coal is locally very clean, but tends to be rather high in sulphur. The Lower Kittanning coal is mined extensively on Blacklick Creek east of Josephine, where it is 3 feet 4 inches thick, and has 4 inches of bone coal on the top. The coal ranges from 2 feet 4 inches to 4 feet thick at Heshbon. The bottom is very rolly, and there is 2 inches of bone coal at the top of the bed. The bed is 3 feet 10 inches thick at Scott Glen, but contains many lenses of pyrite.

The Lower Kittanning is deeply buried in most of the southwestern part of the county. It outcrops at a few points on Crooked Creek where it averages 2 feet 6 inches thick, but it is extremely high in sulphur. The coal is 3 feet 6 inches thick where mined in Center township, and has 3 to 4 inches of bone coal on the top. It is locally 3 feet 10 inches thick in Armstrong township. There are many old openings in this bed southeast of Indiana, where the coal is used for domestic purposes. On Furriers Run the coal is 3 feet thick; on Yellow Creek, 3 feet 6 inches. One mile above Ramsey Run on Two Lick Creek the bed is 6 feet 2 inches thick, including a 16-inch shale parting 14 inches from the bottom. Just above Allen Run on Two Lick Creek the bed is 7 feet 2 inches thick, including a 12-inch shale parting 2 feet 6 inches from the bottom. There are several openings in the Lower Kittanning coal on Penn Run and its tributaries. At Greenville it is 3 feet 10 inches thick; at Atherson's on the North Fork of Penn Run, 1½ miles due north of Greenville, the coal ranges from 3 feet 10 inches to 4 feet 3 inches thick. The coal is mined extensively at Clymer, where it averages 3 feet 3 inches thick, not including a few inches of bone coal at the top. Drilling in the eastern part of the county, where the Lower Kittanning coal is deep under cover, indicates that it is locally thin, but minable in large areas.

The Lower Kittanning coal is exposed in the northeastern part of the county only in the Glen Campbell region, but is not an important bed at present. It is 3 feet 4 inches thick at Hillsdale; 2 feet 10 inches thick near Arcadia. It ranges from 2 feet 8 inches to 4 feet 2 inches thick at Glen Campbell. Locally it has a ½-inch bone parting near the bottom, and also locally a few inches of bone coal at the bottom. At Juneau the coal is 1 foot 7 inches thick and clean; at Enterprise, 12 inches thick; at Richmond, 3 feet 8 inches thick, including a 1½-inch shale parting near the middle of the bed.

The coal ranges from 18 inches to 3 feet thick near the headwaters of Mahoning Creek, and is clean but for numerous knife blades of pyrite.

The Lower Kittanning is deep under cover in most of the northwestern part of the county. Drill hole records indicate that it is locally 4 feet thick, although the average is less than 3 feet. The bed has a persistent bony top, and carries a large quantity of pyrite. Additional detailed measurements follow.

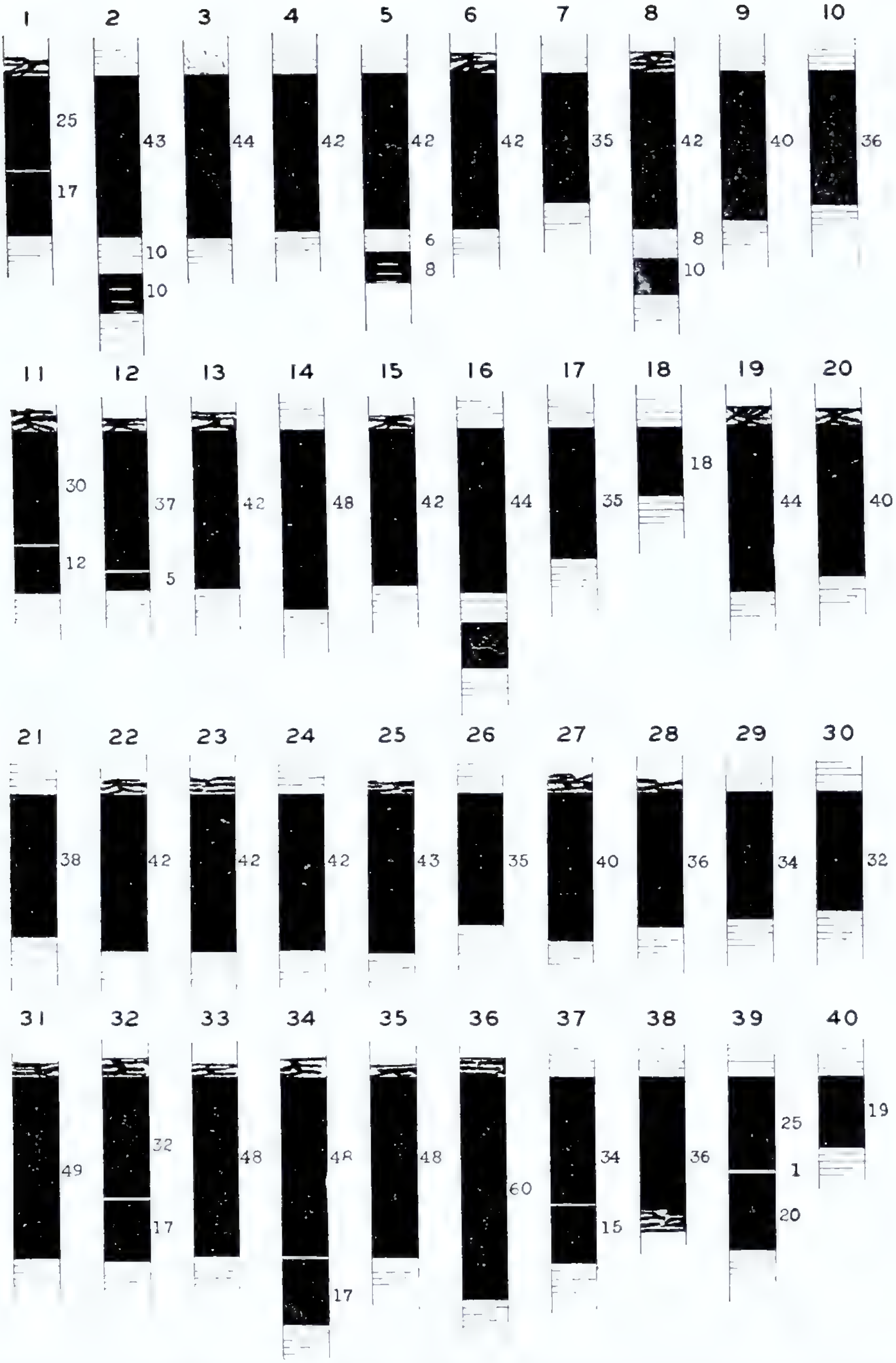


Figure 99. Sections of Lower Kittanning coal in Indiana County.

1. Penelee Coal Corp. Penelee No. 5 mine, at Robindale, East Wheatfield township.
2. Diamond Smokeless Coal Co. Diamond No. 2 mine, at Boltz, East Wheatfield township.
3. Diamond Smokeless Coal Co. Diamond No. 1 mine, 1 mile east of Seward, East Wheatfield township.
4. Armerford Coal Mining Co. Armerford mine, ¼ mile west of Dilltown, East Wheatfield township.
5. Kiskiminetas Coal Co. Brush Valley No. 1 mine, on Blacklick Creek, at Scott Glenn, East Wheatfield township.
6. Joseph Soisson Fire Brick Co. Indiana No. 2 mine, ½ mile northwest of Robinson, West Wheatfield township.

7. Garfield Fire Clay Co. B mine No. 1, 1 mile north of Bolivar, West Wheatfield township.
8. Garfield Smokeless Coal Co. Garfield No. 3 mine, 1 mile north of Bolivar, West Wheatfield township.
9. Cline Coal Co. Cline No. 2 mine, 1 mile northeast of Bolivar, West Wheatfield township.
10. Bells Mill Coal Co. Bells Mill mine, ¼ mile east of Josephine station, Blacklick township.
11. Smith Coal Co. Jewel No. 3 mine, ½ mile east of Josephine, Burrell township.
12. Tide Coal Mining Co. Tide No. 2 mine, at Tide, 2 miles northeast of Homer, Center township.
13. Brush Creek Coal Mining Co. Waterman No. 1 mine, on Tearing Run, 2 miles southeast of Homer City, Center township.
14. Brush Creek Coal Mining Co. Snyder No. 3 mine, 1¼ miles southeast of Homer City, Center township.
15. Punxiana Coal & Coke Co. Frostburg No. 5 mine, 3 miles northeast of Homer City, on Yellow Creek.
16. Caldwell Smokeless Coal Co. Caldwell No. 1 mine, 2 miles west of Dilltown on Blacklick Creek, Brush Valley township.
17. Standard Smokeless Coal Co. Standard No. 1 mine, on Blacklick Creek, 2½ miles northwest of Dilltown, Brush Valley township.
18. Vinton Colliery Co. Vinton No. 16 mine, on Blacklick Creek, 3 miles west of Dilltown, Brush Valley township.
19. Margaret Coal Mining Co. Margaret mine, 1 mile west of Heshbon, Brush Valley township.
20. Bethlehem Mines Corp. No. 78 mine, 1 mile west of Vintondale, Buffington township.
21. Dilltown Smokeless Coal Co. Dilltown No. 1 mine, at Dilltown station, Buffington township.
22. Deringer Fuel Co. Woodland No. 5B mine, ½ mile northwest of Diamondville station, Cherryhill township.
23. Hiram Swank's Sons, Inc. Clymer No. 1 mine, 1 mile southeast of Clymer Station, Cherryhill township.
24. Grampian Coal Co. Penn No. 12 mine, 1 mile northwest of Wandin station, Green township.
25. Lancashire Coal Co. Lancashire No. 18 mine, ¾ mile north of Wandin station, Green township.
26. Estep Bros. Coal Mining Co. Pleasant Valley No. 2 mine, ⅜ mile northwest of Starford station, Green township.
27. La Rayne Coal Co. La Rayne No. 1 mine, 2 miles northeast of Dixonville station, Rayne township.
28. Trojan Coal Mining Co. Trojan No. 3 mine, at Hooverhurst, Montgomery township.
29. Outcrop at Arcadia, Montgomery township.
30. Outcrop on Little Mahoning Creek, 2 miles northeast of Deckers Point, Grant township.
31. Superior Coal Co. Superior No. 2 mine, at Lockvale, Banks township.
32. Keystone Fuel Co. Keystone No. 1 mine, 3 miles southwest of Sidney station, Banks township.
33. Purage Coal Co. Pine Hill No. 1 mine, at Sidney, Banks township.
34. Superior Coal Co. Superior No. 1 mine, 3 miles southwest of Sidney station, Banks township.
35. Banks Coal Co. Banks No. 2 mine, 2 miles west of Sidney, Banks township.
36. Urey Ridge Coal Co. Urey No. 6 mine, 1 mile northeast of Glen Campbell, Banks township.
37. Mine at Glen Campbell, Banks township.
38. Mine at Glen Campbell, Banks township.
39. Outcrop, 1 mile southwest of Enterprise, Canoe township.
40. Outcrop, ½ mile southeast of Juneau, Canoe township.

MIDDLE KITTANNING (C) COAL.

The Middle Kittanning coal, lying 35 to 70 feet above the Lower Kittanning coal, is thin and unimportant in the county, but has been opened for house coal in a few places. Its maximum thickness is 2 feet, and its average is about 6 inches. It measures 18 inches on Blacklick Creek; 16 inches on Two Lick Creek; and locally 2 feet thick on Mahoning Creek.

UPPER KITTANNING (C′) COAL.

The Upper Kittanning coal, lying about 100 feet above the Lower Kittanning coal, is thin and unimportant in this county. There are places near Deckers where it is 5 feet thick and in some spots it is overlain by 4 feet of cannel coal. South of Richmond a 5-foot bed of clean coal is probably at the horizon of the Upper Kittanning. It is locally 4 feet thick on Blacklick Creek. It is extremely variable in thickness and is very bony and high in sulphur.

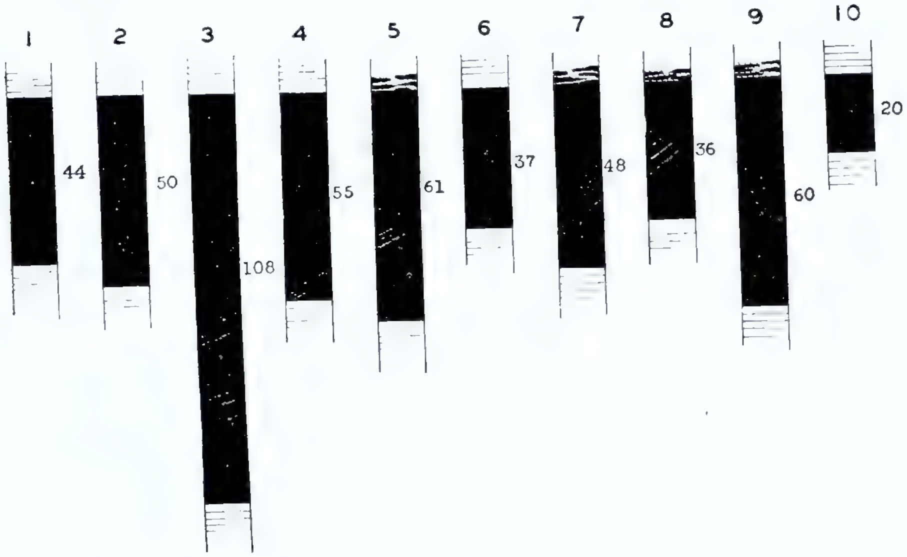


Figure 100. Sections of Upper Kittanning coal in Indiana County.

1. M. J. Fyock Coal Co. Unity No. 1 mine, 1 mile southwest of Savan station, East Mahoning township.
2. Millrich Coal Co. Savan No. 2 mine, 3 miles south of Savan station, Grant township.
3. Mine 2 miles northwest of Deckers Point, Grant township.
4. Outcrop 1½ miles northeast of Deckers Point, Grant township.
5. Outcrop 1 mile south of Richmond, Grant township.
6. Outcrop at Arcadia, Montgomery township.
7. Electric Coal Co. Electric No. 8 mine, at Glen Campbell, Banks township.
8. Susquehanna Fuel Co. Falcon No. 9 mine, 1½ miles northeast of Glen Campbell, Banks township.
9. Urey Ridge Coal Co. Urey No. 1 mine, at Urey, Banks township.
10. Outcrop at Juneau, Canoe township.

LOWER FREEPORT (D, MOSHANNON) COAL.

The Lower Freeport lies from 40 to 80 feet above the Upper Kittanning coal in Indiana County. The coal ranges from 12 inches to 16 feet thick, and varies from a clean coal of excellent quality to a coal high in sulphur and ash.

The Lower Freeport is thin and irregular in all the townships south of Indiana, averaging less than 2 feet thick; furthermore it is high in sulphur. In local areas between Black Lick and Homer City the bed is 3 feet thick, including a 2-inch bone parting 4 inches from the bottom. On Neal Run, near Jacksonville, the maximum thickness of the coal is 5 feet 2 inches. On the divide between Dixon and Buck runs, one mile north of Two Lick Creek, the coal is 4 feet 4 inches thick. South of Dixonville it ranges from 3 feet 6 inches to 4 feet; one-half mile north of Dixonville it is 4 feet 3 inches thick. The coal is excellent, although locally there are many small bands of pyrite scattered through it. The bed ranges from a few inches to 4 feet 9 inches thick in Armstrong township.

The only development of the Lower Freeport in the district east of Indiana is in Pine and Green townships, at Heilwood and Grisemore, where the bed has a maximum thickness of 4 feet. The coal is clean, low in sulphur and ash, and mines out in large lumps. In Grant township, between Richmond and Mahoning Creek, the bed averages 2 feet 6 inches thick in a small area. Locally it has 5 inches of bone coal at the bottom, and a 1-inch bone binder 10 inches from the bottom.

An unusual thickness—16 feet—together with exceptionally good quality is found in Montgomery and Banks townships, in the Glen Campbell district. However, it diminishes rapidly to 2 feet or less. Where thickest the bed is divided into several benches by rather thick partings. The main bench, 6 feet thick, is separated from a lower bench 2 feet to 2 feet 6 inches thick, by a 5-inch clay parting. Over the main bench is a parting of light-drab clay and shale nearly 3 feet thick, containing a 7-inch band of coal near the middle. Above the thick parting is a local bench of coal 4 feet thick. In a few places the coal is a solid bed 4 to 5 feet thick. Generally it ranges from 3 feet to 3 feet 6 inches thick, with benches of bony coal about 8 inches thick, either above or below the main bench.

At Juneau, on Canoe Creek, the coal has a local maximum thickness of 3 feet 8 inches, but the average thickness is less than 2 feet. The coal is thin and irregular in the northwestern townships. It has a maximum thickness of 3 feet in very small areas on the north bank of Plum Creek. In Mahoning township the Lower Freeport coal is locally 5 feet thick, and has only one thin parting near the bottom. The coal is rather high in sulphur, but mines out in good sized lumps.

The Lower Freeport coal averages about 27 per cent volatile matter; 59 per cent fixed carbon; 9 per cent ash; and 1.5 per cent sulphur. In general it is a hard, compact coal that mines out in good sized lumps. Its extreme irregularity in thickness has greatly hindered its development, and will continue to do so until the more valuable Upper Freeport coal has been exhausted.

The following Sections are characteristic of the Lower Freeport coal in Indiana County:

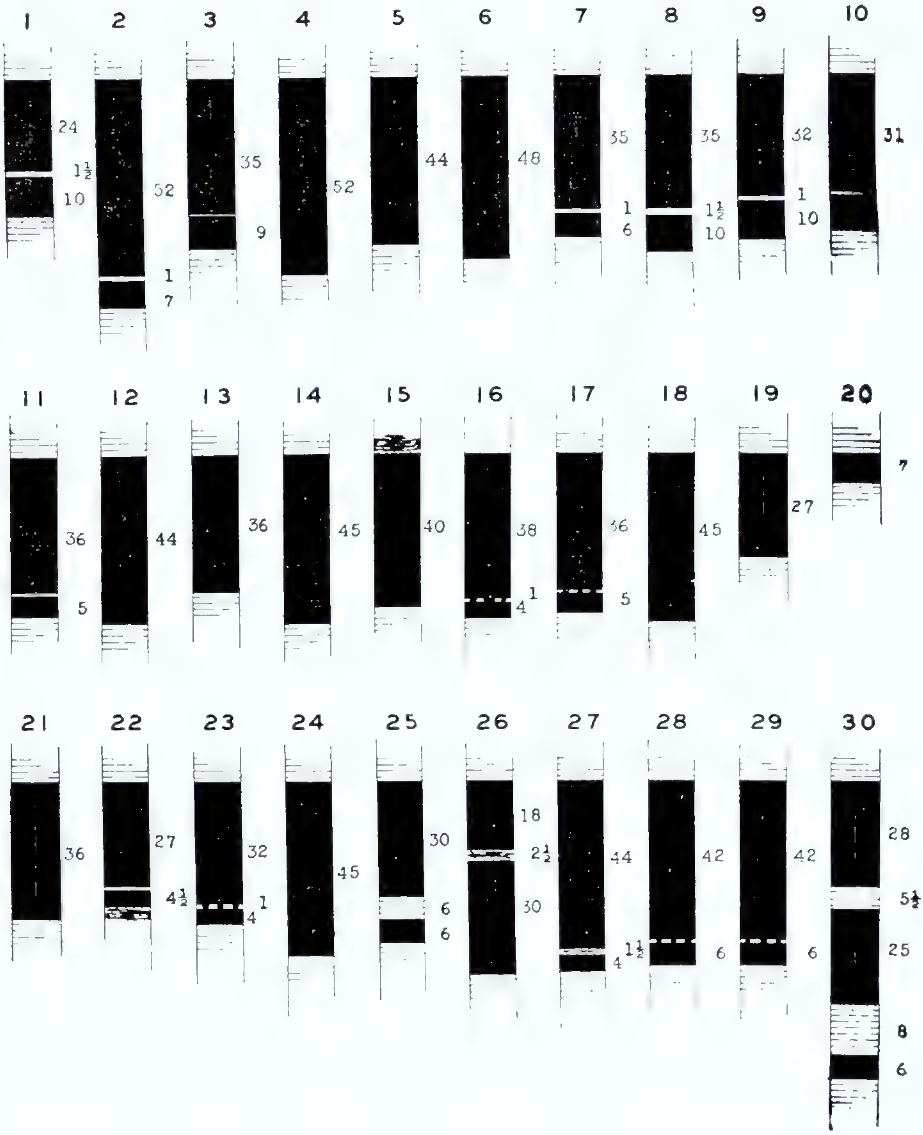


Figure 101. Sections of Lower Freeport coal in Indiana County.

1. Commonwealth Coal Company. Climax No. 3 mine, ½ mile north of Lockport Station, West Wheatfield township.
2. Coal Run Mining Company. Coal Run No. 1 mine, at Coal Run, Young township.
3. Coal Run Mining Company. Coal Run No. 3 mine, 1¼ mile northwest of Kent P. O., Young township.
4. Jefferson and Clearfield Coal & Iron Company. Jacksonville No. 1 mine, on Neal Run, 2¼ miles northwest of Jacksonville (Kent), Young township.
5. Clearfield Bituminous Coal Corp. Sample Run mine, at Sample Run, Cherry Hill township.
6. Bethlehem Mines Corp. Bethlehem No. 3 mine, 1 mile southwest of Heilwood, Pine township.
7. Bethlehem Mines Corp. Bethlehem No. 5 mine, ½ mile south of Heilwood Station, Pine township.
8. Bethlehem Mines Corp. Bethlehem No. 1 mine, ¼ mile east of Heilwood Station, Pine township.
9. Pennsylvania Coal & Coke Corp. Pennsylvania No. 55 mine, at Sides Station, Pine township.
10. Bethlehem Mines Corp. Bethlehem No. 9 mine, at Grisemore, Greene township.
11. Bethlehem Mines Corp. Mine No. 11, at Grisemore, Greene township.

12. Widdowson Coal Mining Company. Widdowson No. 1 mine at Rembrant Station, Greene township.
13. Dixonville Coal Company. Randolph No. 2 mine, ½ mile south of Dixonville Station, Greene township.
14. Milbar Coal Company. Milbar No. 1 mine, ½ mile south of Dixonville Station, Greene township.
15. Clearfield Bituminous Coal Corp. Barr slope, at Barr (Dixonville), Greene township.
16. Northpoint Coal Mining Company. Northpoint mine, ⅕ mile west of Northpoint Station, West Mahoning township.
17. Marion Center Coal Mining Company. Marion No. 1 mine, ¾ mile southeast of Marion Center Station, Greene township.
18. Outcrop 1½ miles north of Rossiter, Canoe township.
19. Outcrop 1 mile southeast of Juneau, Canoe township.
20. Outcrop 1¼ miles west of Locust, Canoe township.
21. Prospect 1½ miles southeast of Richmond, Grant township.
22. Outcrop 1 mile west of Nashville, Grant township.
23. Trojan Coal Mining Company. Trojan No. 2 mine, ½ mile northwest of Gipsy, Montgomery township.
24. H. E. Clark. Indiana No. 5 mine, at Wilgus, Montgomery township.
25. Mine 1 mile southeast of Glen Campbell, Banks township.
26. Mine ¾ mile southeast of Glen Campbell, Banks township.
27. Electric Coal Company. Electric No. 7 mine, ½ mile southeast of Glen Campbell, Banks township.
28. Penn Fuel Company. Penn No. 1 mine, at Glen Campbell.
29. Susquehanna Fuel Company. Falcon No. 8 mine, 1½ miles northeast of Glen Campbell, Banks township.
30. Outcrop 1 mile northwest of Urey, Banks township.

UPPER FREEPORT (E) COAL.

The Upper Freeport coal, lying about 50 feet above the Lower Freeport and about 190 feet above the Lower Kittanning, is the most important coal in the county. Its thickness is variable but it is exceptionally regular in large areas. The bed averages 3 feet 3 inches thick in the entire county, and only locally has any partings and binders. It invariably has a regular fire clay bottom. The roof, where sandstone, is rolly.

The Upper Freeport has been mined extensively on Conemaugh River in Indiana County. It averages less than 2 feet thick at Cramer, but at Seward it is 3 feet thick. There are many small mines at Lockport where it is very irregular, ranging from 3 feet to 6 feet 6 inches thick. A top bench of coal 2 feet to 2 feet 4 inches thick carries much pyrite and is separated from the middle bench by 8 to 12 inches of bony coal. The middle bench is excellent coal, 1 foot 8 inches to 1 foot 10 inches thick. A shale parting ½ inch to 1½ inches thick separates it from a lower bench 1 foot 8 inches to 2 feet 2 inches thick. The coal in the lower bench is high in ash, but has been used with much success for steaming purposes.

At Robinson and Condit, the coal is 6 to 7 feet thick including a persistent bony top 10 to 12 inches thick, and two bone partings, one averaging 4 inches and the other 6 inches. On Blacklick Creek the Upper Freeport coal averages 12 inches thick and where 3 feet thick it is very bony and extremely high in sulphur. In the western townships it averages 4 feet thick. Openings have been made in the vicinity of Jacksonville, where the coal ranges from 3 feet 6 inches to 4 feet 7 inches thick. It is high in ash and sulphur. In Conemaugh township the coal is 3 feet 11 inches thick, with 3 inches of bony coal and shale 6 inches above the bottom. The Upper Freeport is 5 feet thick on Crooked Creek and its tributaries, including a 6-inch shale parting 18 inches from the top. In Armstrong township the Upper Freeport ranges from 2 to 3 feet thick. New operations have started in this bed at Shelocta. The coal thins northward and is 2 feet 10 inches to 3 feet 6 inches thick on South Branch of Plum Creek, and is parted by 1 inch of shale 5 inches from the bottom.

The bed is very important in the northwestern townships. The coal locally averages 6 feet on North Fork of Plum Creek. It carries numerous pyrite lenses, and is parted by 1 inch of shale near the bottom and 5 inches of bone coal near the top. The bed is 4 feet thick on Mahoning Creek in Indiana County, and has 8 inches of bone coal at the top, a ½ to 2 inch bone binder 8 to 10 inches above the bottom, and numerous streaks of pyrite.

The Upper Freeport coal is also very important in the central tier of townships. It is mined extensively on Two Lick Creek. At Graceton it is 6 feet 8 inches thick, including an 8-inch shale parting 2 feet 6 inches from the top. The upper bench carries considerable pyrite, and the lower bench is used, after washing, for making coke. The coke is bright, hard and has well-developed cell structure. On Tearing Run the bed is 6 feet thick, including an 8-inch shale parting 1 foot 7 inches from the top. A number of openings have been made on the Upper Freeport coal on Chestnut Ridge, and measurements show that in this region there is little variation in the thickness of the coal. On the road between Homer and Heshbon, 1¼ miles east of Graceton, the coal is 5 feet thick, including 9 inches of shale and bone 6 to 8 inches from the top. Southeast of Indiana on Two Lick Creek the coal is 7 feet 3 inches thick, including 10 inches of shale 2 feet 3 inches from the top. This thickness is persistent in most of White township.

The Upper Freeport coal again decreases in thickness northward. On the top of the ridge in the vicinity of the road between Indiana and Greenville, the coal is 4 feet thick, including a 1-inch shale parting 9 inches from the bottom, and another 6 inches thick, 8 inches from the top. It is even thinner near Penn Run, and has two 3-inch shale partings. In the area directly north of Penn Run the Upper Freeport is thin and unimportant. On Dixon and Rayne runs the coal is thin and in large areas is entirely lacking.

Recent drilling and studies made by competent engineers indicate that the Upper Freeport coal averages less than 18 inches thick in northern Buffington, Pine, eastern Cherryhill, and southern Green townships. The Upper Freeport is 18 inches thick at Nolo. At

Pineton and Heilwood it ranges from 12 inches to 1 foot 8 inches thick. It is 2 feet 5 inches thick at Mitchells Mills; 2 feet at Cookport; 4 feet 6 inches at Pleasant Valley, but carries a 12-inch bone parting near the top. The coal is thinner at Utah, and the parting is 10 inches thick.

The Upper Freeport coal is a persistent and very valuable bed in the northeastern townships, particularly in the Glen Campbell district. In Grant township, between East and Rairigh runs the coal ranges from 3 feet to 3 feet 7 inches thick and has 4 to 6 inches of bone coal at the top. The coal is 5 feet thick near the western township line, southwest of Kinter Hill; 4 feet near Richmond and north of Kinter Hill. East of Mahoning Creek in Grant and Montgomery townships the coal ranges from 2 to 5 feet thick, locally has a thin bone parting near the bottom, and a few inches of bone at the top. The coal averages about 3 feet thick in Banks township. It has a characteristic parting 1 or 2 inches thick a few inches from the bottom, and invariably a few inches of bone coal at the top. It is 5 feet 8 inches thick at Rossiter, Canoe township, and has a 2-inch shale parting 6 inches from the bottom. South of Rossiter the coal thins to 4 feet, but is clean. At Juneau the coal varies in thickness and is rather dirty locally. A few miles south of Locust the coal is 4 feet 4 inches thick including 4 inches of bone coal at the top. Near Enterprise it is 3 feet 10 inches, not including 5 to 10 inches of bone coal at the top of the bed.

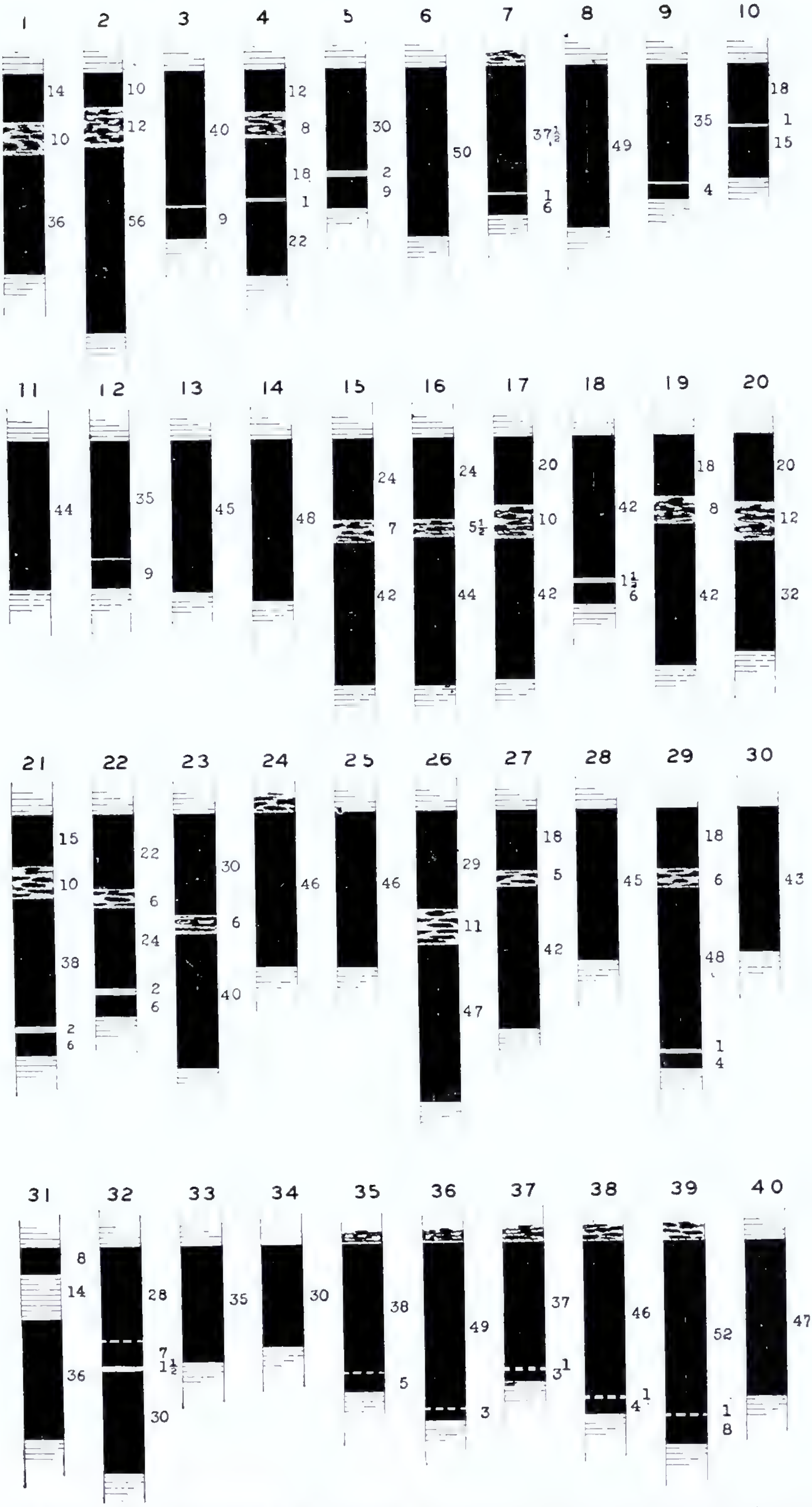


Figure 102. Sections of Upper Freeport coal in Indiana County.

1. Garfield Fire Clay Co. Mine No. 2-E, 1 mile north of Bolivar, West Wheatfield township.
2. Joseph Soisson Fire Brick Co. Indiana No. 3 mine, 1 mile north of Bolivar, West Wheatfield township.
3. Garfield Smokeless Coal Co. Garfield No. 1 mine, 1 mile northeast of Bolivar, West Wheatfield township.
4. Commonwealth Coal Co. Climax No. 2 mine, $\frac{1}{4}$ mile east of Lockport station, West Wheatfield township.
5. Strangford Coal Co. Strangford mine at Strangford, Burrell township.
6. Jefferson & Clearfield Coal & Iron Co. Jacksonville No. 5 mine, 1 mile northeast of Jacksonville, Blacklick township.
7. L. W. Robinson, Jr. Virginia mine, $\frac{1}{3}$ mile southwest of Kent station, Blacklick township.
8. Jefferson & Clearfield Coal & Iron Co. Harriet mine, 1 mile south of Jacksonville, Blacklick township.
9. Watson Coal Co. Watson No. 1 mine, at White, Conemaugh township.
10. Kiskiminetas Coal Co. Tunnelton mine, $\frac{1}{2}$ mile west of Tunnelton, Conemaugh township.
11. Coal Run Mining Co. Coal Run No. 6 mine, on Neal Run, $1\frac{1}{2}$ miles north west of Jacksonville P. O., Young township.
12. Coal Run Mining Co. Coal Run No. 5 mine, 2 miles west-northwest of Kent, Young township.
13. Jefferson & Clearfield Coal & Iron Co. Jacksonville No. 2 mine, on Neal Run, $2\frac{1}{4}$ miles northwest of Jacksonville, Young township.
14. Jefferson & Clearfield Coal & Iron Co. Jacksonville No. 3 mine, on Aultman Run, 2 miles northeast of Jacksonville, Center township.
15. Rochester and Pittsburgh Coal & Iron Co. At Homer City, Center township.
16. Rochester and Pittsburgh Coal & Iron Co. Lucerne No. 1 mine, on Yellow Creek, 1 mile northeast of Homer City, Center township.
17. Tide Coal Mining Co. Tide No. 3 mine, at Tide, Center township.
18. Graceton Coke Co. Graceton No. 2 mine, 2 miles east of Graceton, Center township.
19. Brush Creek Coal Mining Co. Luciusboro No. 1 mine, $2\frac{1}{4}$ miles southeast of Homer City, Center township.
20. Brush Creek Coal Mining Co. Coy No. 1 mine, $\frac{3}{4}$ mile southeast of Homer City, Center township.
21. Homer City Coal Co. Thermal No. 8 mine, 1 mile south of Homer City, Center township.
22. Graceton Coke Co. Graceton No. 3 mine, 1 mile northeast of Graceton, Center township.
23. Potter Coal & Coke Co. Potter mine, $\frac{1}{5}$ mile east of Coral station, Center township.
24. Punxiana Coal & Coke Co. Frostburg No. 4 mine, on Yellow Creek, $2\frac{1}{4}$ miles northeast of Homer City, Brush Valley township.
25. Jefferson & Clearfield Coal & Iron Co. Ernest No. 4 mine, on Fulton Run, $1\frac{1}{2}$ miles southwest of Creekside, White township.
26. Jefferson & Clearfield Coal & Iron Co. Ernest No. 3 mine, near McKees Run, $\frac{3}{4}$ mile southeast of Creekside, Rayne township.
27. Jefferson & Clearfield Coal & Iron Co. Ernest No. 2 mine, on McKees Run, 1 mile east of Creekside.
28. Jefferson & Clearfield Coal & Iron Co. Cummings shaft, on Crooked Creek, $1\frac{1}{8}$ miles northeast of Creekside, Rayne township.
29. Seneca Coal Mining Co. Seneca No. 1 mine, $\frac{1}{4}$ mile northeast of Chambersville station, Rayne township.
30. George Coal Mining Corp. Peterman No. 1 mine, 1 mile northeast of Chambersville station, Rayne township.
31. Andora Coal Co. Andora No. 1 mine, 1 mile northeast of Starford station, Green township.
32. Clearfield Bituminous Coal Corp. Commodore No. 3 mine, $\frac{3}{4}$ mile northeast of Commodore station, Green township.
33. Clearfield Bituminous Coal Corp. Commodore No. 1 mine, $\frac{1}{4}$ mile northeast of Commodore station, Green township.
34. Pennsylvania Coal & Coke Corp. Pardee No. 40 mine, at Arcadia, Montgomery township.
35. Pennsylvania Coal & Coke Corp. Pardee No. 42 mine, at Arcadia, Montgomery township.
36. Pennsylvania Coal & Coke Corp. Pardee No. 41 mine, at Arcadia, Montgomery township.
37. Pennsylvania Coal & Coke Corp. Pardee No. 43 mine, at Wilgus, Montgomery township.
38. Pennsylvania Coal & Coke Corp. Pardee No. 44 mine, at Gipsy, Montgomery township.
39. Patchin Coal Mining Co. Patchin No. 7 mine, 1 mile west of Gipsy, Montgomery township.
40. Outcrop at Richmond, Grant township.

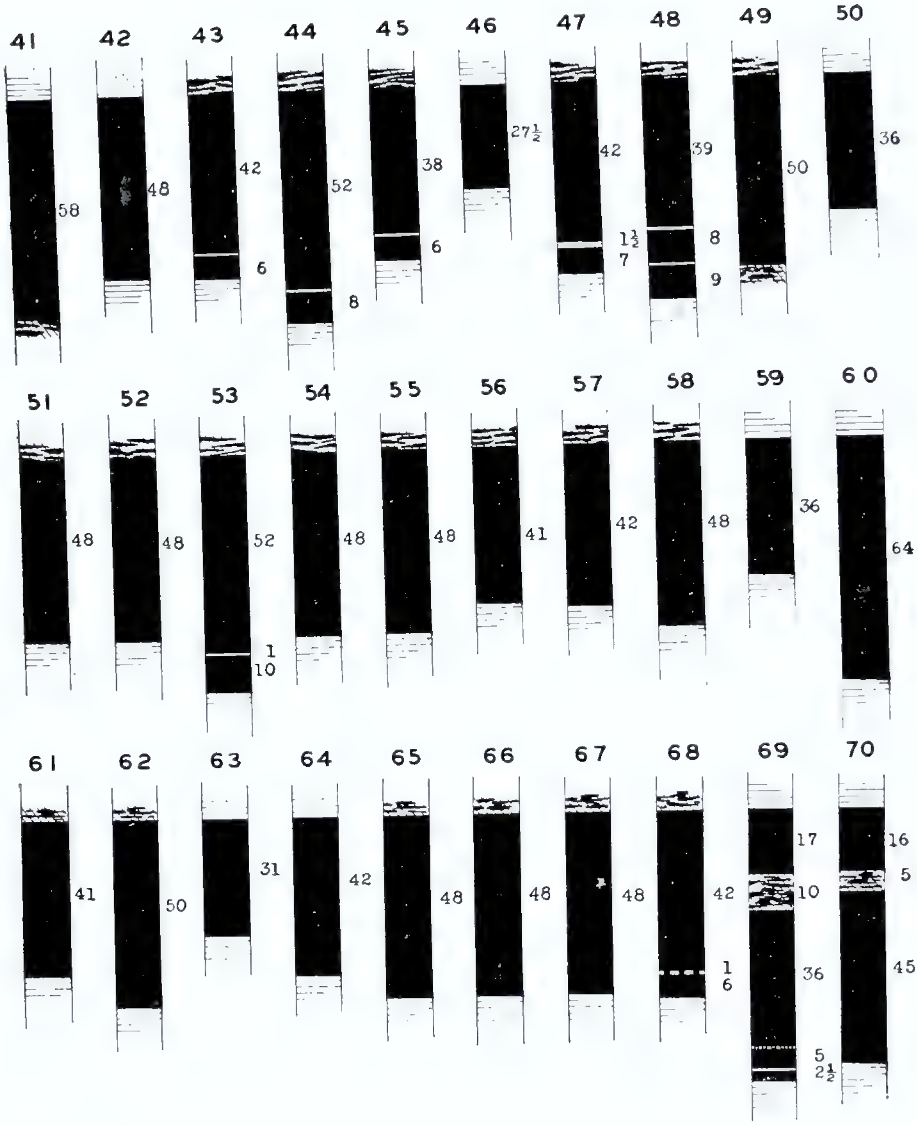


Figure 103. Sections of Upper Freeport coal in Indiana County.

41. Outcrop 2 miles northwest of Deckers Point, Grant township.
42. Mine 1½ miles southeast of Richmond, Grant township.
43. Hillside Coal & Coke Co. Hillsdale mines, at Smithport, Banks township.
44. W. B. Coal Co. W. B. mine, 1 mile west of Smithport, Banks township.
45. Mine ½ mile northwest of Glen Campbell, Banks township.
46. Mine ½ mile northeast of Glen Campbell, Banks township.
47. Prospect 1 mile west of Urey, Banks township.
48. Outcrop 1¼ miles west of Urey, Banks township.
49. Prospect ½ mile northeast of Smithport, Banks township.
50. Outcrop 2 miles northwest of Urey, Banks township.
51. Kanma Coal Mining Co. Emlon No. 1 mine, 1 mile west of Sidney station, Banks township.
52. Pratt Coal Company. Pratt No. 1 mine, at Elbell, Banks township.
53. Punxsutawney Coal Mining Co. Frances No. 3 mine, 2½ miles southeast of Rossiter, Banks township.
54. Punxsutawney Coal Mining Co. Frances No. 2 mine, 2 miles southeast of Rossiter, Canoe township.
55. Punxsutawney Coal Mining Co. Frances No. 1 mine, at Rossiter, Canoe township.
56. Juneau Coal Mining Co. Juneau No. 1 mine, at Juneau, Canoe township.

57. Locust Colliery Co. Locust No. 1 mine, at Locust, Canoe township.
58. Hess Coal Co. Hess Coal Co., 1 mile north of Savan, Canoe township.
59. Dor-Mar Coal Co. Dor-mar No. 1 mine, ½ mile north of Savan station, Canoe township.
60. Outcrop 3 miles east of Locust, Canoe township.
61. Outcrop 1 mile north of Enterprise, Canoe township.
62. Outcrop at Enterprise, Canoe township.
63. Penn Troy Coal Co. Penn Troy No. 1 mine, ¼ mile northwest of Savan station, East Mahoning township.
64. Savan Collieries Co. Savan No. 1 mine, ¾ mile southwest of Savan station, East Mahoning township.
65. Sutter Coal Co. Hamilton No. 1 mine, 1 mile south of Hamilton station, North Mahoning township.
66. McCombs Coal Co. Rossmoyne mine, at Rossmoyne, South Mahoning township.
67. Sutter and Rinn Coal Co. Ben Raven No. 1 mine, at Sharpsburg, South Mahoning township.
68. Sutter and Rinn Coal Co. Ben Raven No. 2 mine, at Plumville, South Mahoning township.
69. Buffalo and Susquehanna Coal & Coke Co. Sagamore No. 11 mine (abandoned), 1½ miles northeast of Sagamore, South Mahoning township.
70. Kurtz Coal Co. McCreight mine, 1 mile northeast of Sagamore, South Mahoning township.

Analysis of the Upper Freeport coal in Indiana County.

	Per cent	
	Range	Average
Volatile matter	24-34	28
Fixed carbon	55-67	58
Ash	6-11	9
Sulphur	1-3.5	2

It is a stick and block coal, of brilliant lustre, friable, and crumbles in handling. It is an excellent steam coal, and when washed makes good coke.

COAL BEDS IN CONEMAUGH GROUP.

The Conemaugh group contains about five coals that average less than 12 inches thick, but locally have a maximum thickness of 3 feet. Little is known about these coals, and their correlation is indefinite. No attempt will be made to name them in this report.

Near Gaibleton there are two coals about 60 and 130 feet above the Upper Freeport. The lower one is 2 feet thick. The higher coal is 3 feet thick on Brush Run and on the hills west of Rayne Run.

On the headwaters of Crooked Creek between Onberg and Ideal, there are several openings in the Conemaugh group on a coal bed above the Mahoning sandstone, and about 100 feet above the Upper Freeport. The coal is 2 feet 10 inches thick, including 4 inches of bone coal, 6 inches from the top.

On Brush Creek, 1½ miles southwest of Mechanicsburg, a coal about 200 feet above the Upper Freeport has been opened, and is reported to be 3 feet thick.

A coal bed about 225 feet above the Upper Freeport is 3 feet thick near Kellers Mill, and appears to be rather persistent in a considerable area. The lower part of the bed is dirty, but the upper part is excellent, clean coal.

A coal at the Harlem horizon has been seen on Two Lick Creek. It is very irregular, has a maximum thickness of 2 feet 4 inches, but is of excellent quality.

PITTSBURGH COAL.

The northernmost area of Pittsburgh coal in Pennsylvania is in the highland on the Armstrong-Indiana county line south of Crooked Creek. The bed underlies 12½ square miles in Indiana County. It ranges from 6 to 10 feet thick, including partings and roof coal. Generally the roof coal is so dirty that it is not mined, but used as a roof to hold up the soft shales above it. The bed is 7 feet 2 inches thick at West Lebanon, including a ½ inch shale parting 2 feet 2 inches from the bottom, and 4 inches of bony coal 2 feet 2 inches from the top. The coal is 9 feet thick at Iselin, including a 6 inch shale parting 2 feet from the bottom; on Big Run 8 feet thick, including 12 inches of shale 1 foot 8 inches from the top; on Kiskiminetas River the bed is 6 feet 9 inches thick and carries a 1½ inch shale parting 2 feet 5 inches above the bottom.

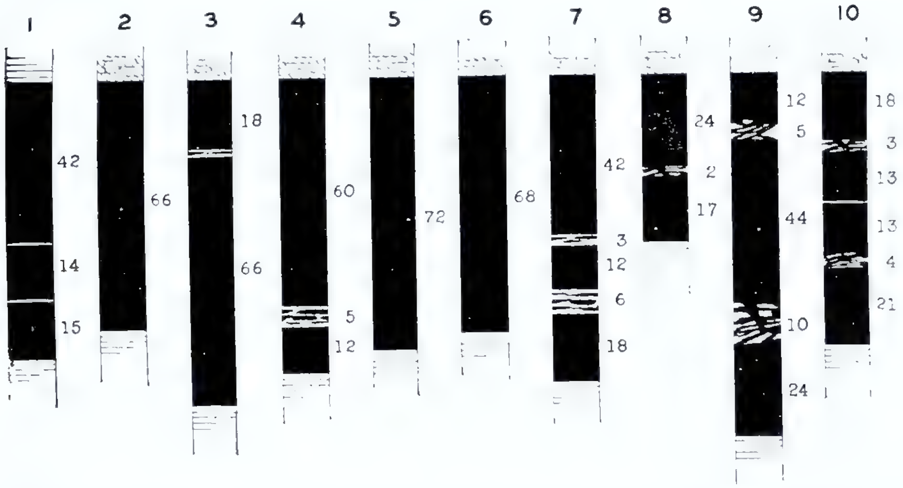


Figure 104. Sections of Pittsburgh coal in Indiana County.

1. Graff Coal Company. Black Lick mine, 1¼ miles west of Blacklick Station, Blacklick township.
2. Pittsburgh Gas Coal Company. Iselin No. 3 mine, 1¼ miles south of West Lebanon, Young township.
3. Pittsburgh Gas Coal Company. Iselin No. 5 mine, on Whisky Run, 1 mile southwest of West Lebanon, Young township.
4. Shrader Gas Coal Company. Penn American mine, on Whisky Run, 1½ miles north of Reed Junction, Young township.
5. Lowther Coal Company. Ruth mine, ¼ mile west of Reed Junction, Young township.

6. Pittsburgh Gas Coal Company. Iselin No. 4 mine, on Nesbit Run, 1 mile northeast of Iselin, Young township.
7. Pittsburgh Gas Coal Company. Iselin No. 2 mine, on Harpers Run, 1½ miles northwest of Clarksburg (at Iselin), Young township.
8. Pittsburgh Gas Coal Company. Iselin No. 1 mine, on Harpers Run, 2 miles northwest of Clarksburg, Young township.
9. Pittsburgh Gas Coal Company. Fritz No. 2 mine, on Big Run, 1½ miles west of Iselin, Young township.
10. Pittsburgh Gas Coal Company. Fritz No. 3 mine, on south branch of Big Run, 1½ miles southwest of Iselin.

The Pittsburgh coal averages 56 per cent fixed carbon, 33 per cent volatile matter, 8 per cent ash, and 1.5 per cent sulphur. It is a hard stick and block coal, and mines out in fair sized lumps.

REDSTONE COAL.

The Redstone coal, lying about 45 feet above the Pittsburgh bed, and composed of alternating bands of shale and coal, is very thin and irregular. It has a maximum thickness of 3 feet at Elders Ridge, but is too impure to be mined.

SEWICKLEY COAL.

The Sewickley coal, lying 125 feet above the Pittsburgh, underlies a small area in the highest hills near Elders Ridge. It is 2 to 5 feet thick, but has not been mined because of its high ash and sulphur content.

CHAPTER XVII.

JEFFERSON COUNTY

INTRODUCTION

Jefferson County has been the scene of active mining for thirty or forty years. When this county first became a factor in the coal production of Pennsylvania the principal mining area was in the vicinity of Reynoldsville, where the Lower Freeport was mined and shipped as an excellent steam coal. This area of thick coal is nearly depleted, but other areas have been prospected and opened up and the production of coal from Jefferson County has gradually increased.

There are eleven coal beds in the county; some are only a few inches thick, two are of great importance, and five others are locally minable. The Lower Freeport coal is the most important and the Lower Kittanning is second. The Brookville, Clarion, Middle and Upper Kittanning, and Upper Freeport are locally minable.

Jefferson County has many railroads. The Bellwood Branch of the Pennsylvania Railroad enters the county from the south near Bowersville, runs northwest and branches at Elk Run Junction; one branch runs north to Anita, and the other west to Punxsutawney and Fordham. The Low Grade Division of the Pennsylvania Railroad enters the county from the west near Patton, runs northeast to Brookville, Reynoldsville, and to DuBois, Clearfield County. It runs north from that point, and crosses the northeast corner of Jefferson County, serving the Brockwayville district.

The Pittsburgh and Shawmut Railroad enters the county from the west near Timblin, runs northeast through Knox and Brookville, and terminates in the northeast corner of the county at Delwood and Lanes Mills.

The Buffalo, Rochester and Pittsburgh Railroad follows Clarion River across the northeast corner and Mahoning Creek across the southeast corner of the county. Several branches serve mining towns not on the main line.

The New York Central Railroad has a few miles of track in the county west of Brookville. It has trackage right in Jefferson County on the Low Grade Division of the Pennsylvania Railroad east of Brookville.

The Erie Railroad has a few miles of track in the northeastern part of the county. The Pittsburgh, Shawmut and Northern Railroad also uses this track.

Jefferson County is a maturely dissected region, with rolling, flat-topped hills which represent the remnants of an old peneplain. The valleys are not all alike; in places the slopes are steep and rugged, in others gentle. The streams have broad flood plains in the soft rocks, but in the hard rocks they flow through narrow ravines.

STRUCTURE.

The rocks of Jefferson County are folded in a regular succession of approximately parallel anticlines and synclines, having a general northeast-southwest trend.

Chestnut Ridge anticline is a broad fold east of Punxsutawney on which the rocks rise 1000 feet in 9 miles.

Punxsutawney syncline lies in the southeast corner of the basin, which is flat; the Upper Freeport coal has an elevation of less than 1150 feet above sea level. From that elevation the coal rises gradually southeast toward Chestnut Ridge anticline.

There is a broad bench on the slope between Chestnut Ridge anticline and Punxsutawney syncline in the region north and west of Juneau. This bench is believed to be responsible for the accumulation of gas in that area.

Perrysville anticline, lying northwest of Punxsutawney syncline, enters Jefferson County near Perrysville, and trends northeast across the county. This anticline has raised the Freeport coals, so that they are within easy mining distance of the surface. This fold is best defined on Sandy Lick, from which point it subsides in both directions.

Smicksburg syncline lies between Perrysville and Roaring Run anticlines. It is a broad shallow basin about two miles northwest of Perrysville, and flattening out just northwest of Rockdale.

Roaring Run anticline is one of the well-defined structures of Jefferson County. It enters the county near the southwest corner, and trends northeast near Coolspring and Warsaw. The dips are rather gentle on both flanks, and its axis varies greatly in elevation.

Leechburg syncline, lying northwest of Roaring Run anticline, is a broad shallow basin, with the axis rising gradually northeast. Ringgold, Worthville, Bellview, Port Barnett, Richardsville, Warsaw, and Schoffners Corners are in this basin.

Brookville anticline lies west of the Leechburg basin, and enters Jefferson County just above the mouth of Little Sandy Creek, extends northeast near Brookville, and leaves the county a few miles north of Schoffners Corners. The fold is well-defined, and its axis is straight. The dips on the flanks are rather gentle.

Anthonys Bend anticline crosses the county from near Corsica to Millstone on Clarion River. It is a well-developed structure at Corsica, where the rocks dip strongly southeast, but flattens out northeastward.

Centreville syncline enters the county about one mile northwest of Corsica, and crosses Clarion River east of Clarington. It is the shallowest basin in Jefferson County.

Kellersburg anticline, crossing the northwest tip of the county, is a broad fold, with gentle dips on both flanks.

The structure in the northeastern part of the county has not been studied in detail, but probably there are two or more minor structures in that region.

STRATIGRAPHY.

The outcropping consolidated rocks of Jefferson County are of Carboniferous age, and include the Conemaugh and Allegheny groups and the Pottsville, Mauch Chunk, and Pocono series. Sand, silt, and gravel deposited by streams at times of high water are present in the larger valleys.

The Conemaugh group has been eroded in most of Jefferson County, and is nowhere intact. It is composed of sandstone, shale, thin limestones, and unimportant coal beds.

The Allegheny group has been entirely eroded in one-third of Jefferson County, and the total thickness of 300 feet is present only in the eastern and southern parts of the county. The Allegheny group is composed of massive sandstones, clays, shales, limestones, and several important coal beds.

The Pottsville series, outcropping in the northern and western parts of the county, is 300 feet thick and composed of massive sandstones, shales, clay, and coal beds.

The Mauch Chunk series, outcropping below Summerville on Mahoning Creek and on Clarion River, is composed entirely of shales.

The Pocono series has a very limited outcrop on Mahoning Creek and Clarion River. It is composed entirely of sandstone.

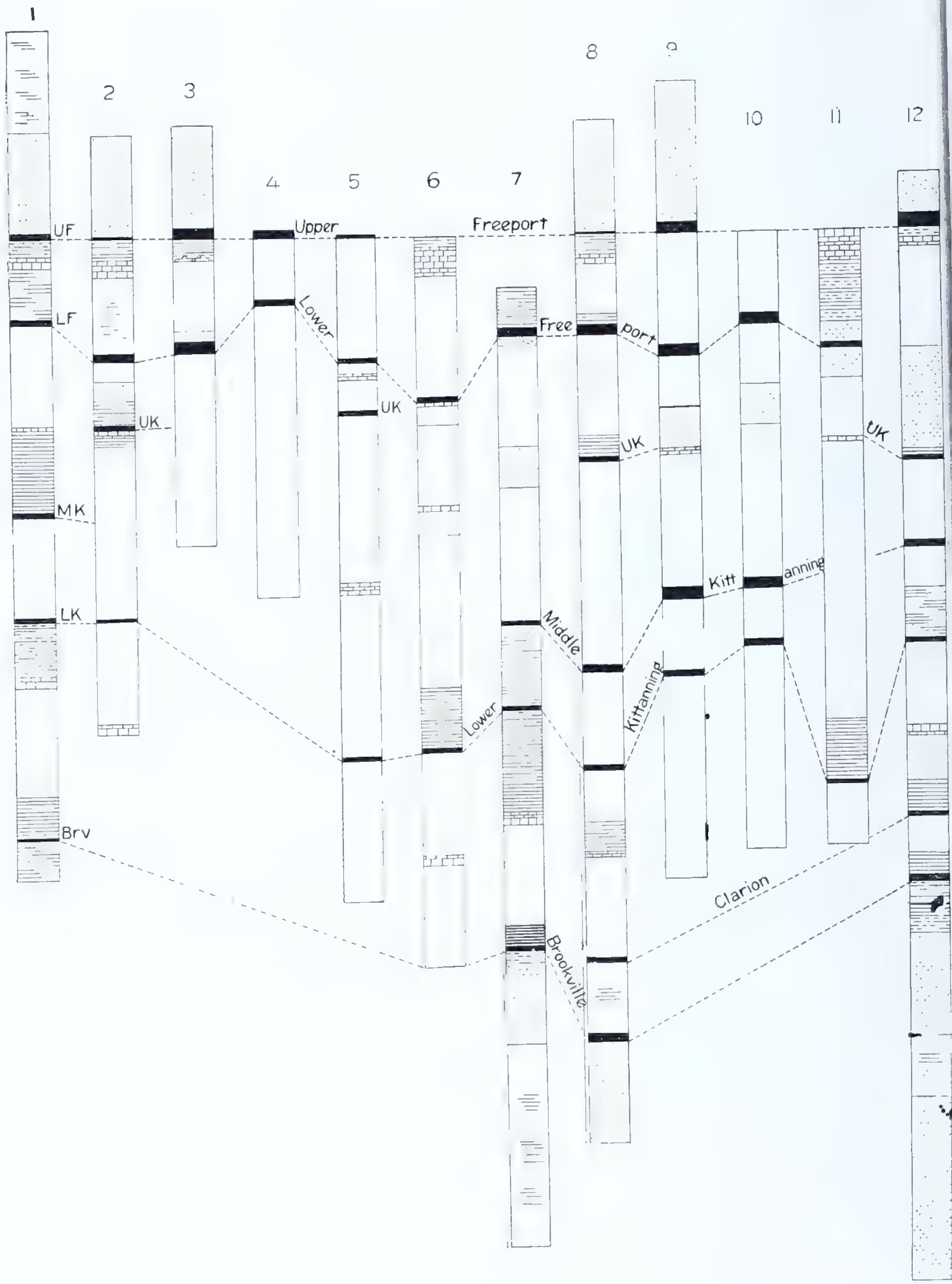


Figure 105. Stratigraphic sections. Jefferson County.

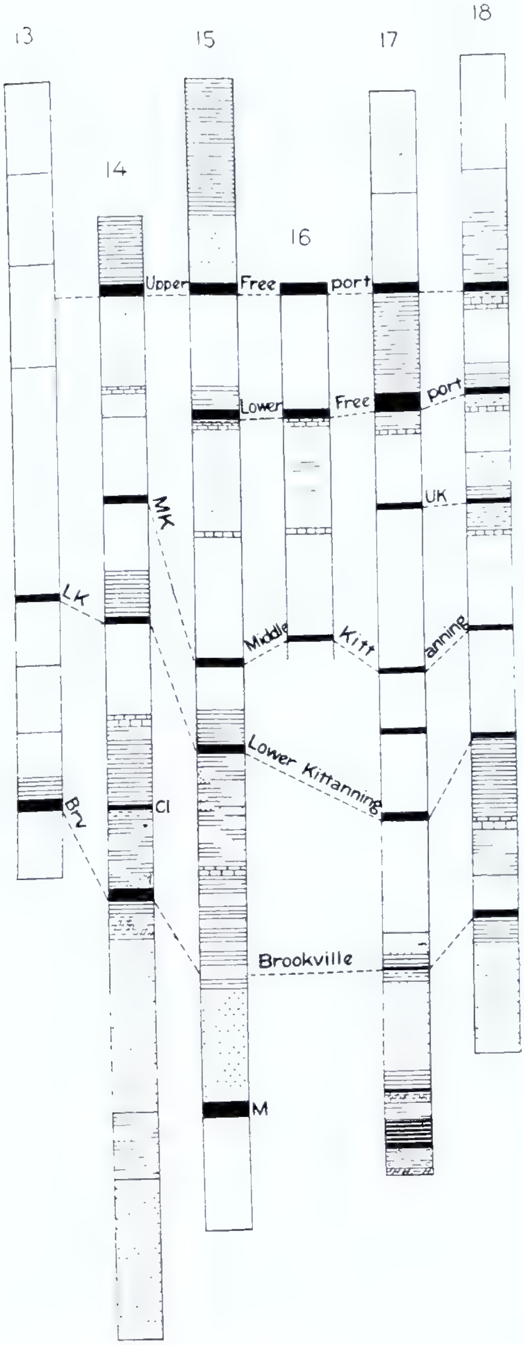


Figure 106. Stratigraphic sections cont. Jefferson County.

1. Generalized section, Porter Township. Pennsylvania Second Geological Survey, Rept. H6, pp. 3 and 4.
2. Section at Perrysville. Pennsylvania Second Geological Survey, Rept. H6, pp. 9 and 10.
3. Generalized section, Allegheny group, Young Township. Pennsylvania Second Geological Survey, Rept. H6, pp. 20 and 21.
4. Section at Bowers, Gaskill Township. Pennsylvania Second Geological Survey, Rept. H6, p. 37.
5. Section on Pine Run. Pennsylvania Second Geological Survey, Rept. H6, p. 41.
6. Generalized section, Ringgold Township. Pennsylvania Second Geological Survey, Rept. H6, p. 46.
7. Section at Big Run. Pennsylvania Second Geological Survey, Rept. H6, p. 56.
8. Section on Little Sandy Creek. Pennsylvania Second Geological Survey, Report H6, p. 56.
9. Generalized section, McCalmont Township. Pennsylvania Second Geological Survey, Rept. H6, p. 64.
10. Section at Uplinge, Henderson Township. Pennsylvania Second Geological Survey, Rept. H6, p. 70.
11. Section at Worthville. Pennsylvania Second Geological Survey, Rept. H6, p. 80.
12. Generalized section, Clover Township. Pennsylvania Second Geological Survey, Rept. H6, p. 90.
13. Section on Knapp Run, Clover Township. Pennsylvania Second Geological Survey, Rept. H6, p. 96.
14. Generalized section, Rose Township. Pennsylvania Second Geological Survey, Rept. H6, p. 100.
15. Generalized section, Knox Township. Pennsylvania Second Geological Survey, Rept. H6, p. 110.
16. Section at Mathews farm, on Lick Run, Knox Township. Pennsylvania Second Geological Survey, Rept. H6, p. 116.
17. Generalized section, Winslow Township. Pennsylvania Second Geological Survey, Rept. H6, p. 124.
18. Section at Brockwayville. Pennsylvania Second Geological Survey, Rept. H6, p. 186.

COALS.

All the commercial production of coal in Jefferson County is from beds in the Allegheny group. This group is present in practically every township in Jefferson County, but much of it has been eroded in the northern townships. The erosion is progressively greater from southeast to northwest. In the southeastern townships some of the Conemaugh group, lying above the Allegheny, is present.

The coals of Jefferson County are discussed in ascending geological order.

MERCER COAL.

The Mercer coal is the only bed in the Pottsville series that can be traced in large areas. It varies much in physical and chemical character, and is probably of workable thickness in a few areas in the county. Its thickest outcrop is 9 feet at Fullers Station on Sandy Lick Creek. It is dirty and has three thick shale partings. The Mercer coal has been mined at Port Barnett where it averages 2 feet 4 inches thick. It is dirty and high in ash and sulphur.

The outcrop of the Mercer coal is limited principally to the northwestern townships of Jefferson County. It is deep under cover in the remainder of the county. Little is known of its thickness and quality in the southeastern part of the county, but it has been drilled through and found to have its characteristic position in the Pottsville series. More easily accessible coals are of such great importance that the Mercer will probably have no commercial value for a great many years.

Coal beds in Jefferson County.

Group	Name of coal bed	Average interval	Range in thickness of coal beds		
			Ft.	Ft	in.
	Mahoning		0	2	0
		75			
Allegheny	Upper Freeport (E)		1	6	0
		45			
	Lower Freeport (D)		1	13	8
		50			
	Upper Kittanning (C′)		0	3	0
		50			
	Middle Kittanning (C)		0	4	10
		55			
	Lower Kittanning (B)		0	3	0
		60			
	Clarion (A′)		0	1	4
		30			
	Brookville (A)		0	6	0
	Mercer		0	9	0

BROOKVILLE (A) COAL.

The principal outcrop of the Brookville bed is in the northern and western parts of Jefferson County. It is deep under cover in most of the southern part of the county, and drill hole records indicate that it is rarely too thin to be mined although it varies greatly in thickness.

The Brookville is important as a commercial coal only in the vicinity of Brookville, principally in Clover and Knox townships.

In Clover township the Brookville bed ranges from 3 to 5 feet thick, averaging 4 feet. On the New York Central and Hudson River Railroad, between Summerville and Baxter, the Brookville averages 3 feet 6 inches thick, and has a maximum thickness of 4 feet 6 inches. Near the eastern township line the Brookville is 4 feet 4 inches thick, including two bone partings which divide the bed into three benches. The top bench is 12 inches thick separated from the middle bench, 3 feet thick, by a bone parting 2½ inches thick. The middle bench is underlain by a bone parting 2 inches thick. The bottom bench is usually 1 inch thick. On the New York Central Railroad two miles west of the eastern Clover township line, the Brookville is 3 feet thick, not including 8 inches of draw slate above the bed. The top bench of coal is 9 inches thick separated from the bottom bench by 1½ inches of hard bone binder. The bottom bench of coal is 2 feet 2 inches thick.

At Summerville the Brookville has a total thickness of 5 feet, and is separated into three benches by bone coal partings. The top bench is 13½ inches thick, and is separated from a middle bench, 2 feet 3½ inches thick, by 2½ inches of bone coal. The middle bench is underlain by 10 inches of bone coal. The bottom bench of coal is 8 inches thick. North and northwest of Summerville the Brookville bed is persistently 4 feet thick. It occurs in three benches. The top bench ranges from 3 to 6 inches thick, and is separated from the middle bench by a bone and pyrite binder 3 to 4 inches thick. The middle bench ranges from 12 to 15 inches thick, and is separated from the bottom bench, 1 foot 8 inches to 2 feet thick, by a bone parting 2 to 3 inches thick.

The Brookville is mined in Rose township south of Brookville. It averages 4 feet thick and occurs in two benches. The top bench is 12 inches thick and is separated from the bottom bench by a 2-inch bone binder. The bottom bench is 2 feet 8 inches thick. "Sulphur" bands are scattered through both benches. The bed is very irregular in thickness, and rock faults and rolls often cut out the bed entirely.

The Brookville is being mined in Beaver township near Conifer. It averages 4 feet thick, and is extremely variable in physical character. In some localities the coal occurs in two benches, but typically it is divided into three benches by shale and bone partings. The top bench ranges from 10 to 11 inches thick, and is underlain by a shale and bone binder 1½ to 2 inches thick. The middle bench of coal ranges from 1½ inches to 2 feet 6 inches thick, and is separated from the lower bench by a bone coal parting 1 inch to 1½ inches thick. The bottom bench ranges from 10 inches to 2 feet 7 inches thick, and locally contains two or more thin bone binders at various positions in the bench.

In Knox township the Brookville ranges from 2 feet 10 inches to 4 feet 8 inches thick. It occurs in two or three benches separated by bone coal partings. The bed is never entirely clean. In the vicinity of Norman the coal ranges from 4 feet 2 inches to 4 feet 6 inches thick. The bed is overlain by draw slate ranging from 2 to 8 inches thick. The top bench ranges from 12 to 14 inches thick, and is separated from a middle bench, 2 feet 6 inches to 2 feet 8 inches thick, by a hard bone binder 1½ inches thick. The bottom bench ranges from 10 to 16 inches thick, and is separated from the middle bench by a pyrite band ½ to 1 inch thick. The bottom bench locally contains a bony coal parting ½ inch to 2 inches thick.

In the vicinity of Knoxdale, and northwest along the Pittsburgh and Shawmut Railroad the Brookville averages 4 feet 10 inches thick. The top bench is 11 inches thick, separated from a middle bench, 2 feet 2 inches thick, by a sandstone or bone binder 1½ inches thick. The middle bench is separated from a bottom bench, 3 inches thick, by a bone and shale parting 3½ inches thick. The bottom is fire clay.

On Sandy Lick Creek, in the eastern part of Knox township, the Brookville ranges from 2 feet 10 inches to 4 feet thick. It is characteristically separated into two benches by a bone coal parting 2 to 4 inches thick, 14 to 18 inches below the top. The bottom bench of coal ranges from 1 foot 8 inches to 2 feet 3 inches thick.

The Brookville is being mined at only one point in Pine Creek township, and that is near the eastern township line on Sandy Lick Creek. The bed is 2 feet 7 inches thick including one 3-inch parting. The coal is overlain by bone coal 3 inches thick. The top bench is 15 inches thick, and the bottom bench 16 inches. In the central and northern parts of Pine Creek township the Brookville is locally 4 feet thick, but these areas are at some distance from the railroad and they have not been developed with the exception of a few small mines for local fuel. Locally the bed occurs in three benches separated by a bone parting, but the usual characteristic of the bed is a bone binder 2 to 4 inches thick near the middle.

The Brookville is opened at a few points east of Pine Creek township. It is being commercially mined near the southern line of Washington township four miles northeast of Reynoldsville. In this vicinity it averages 4 feet 2 inches thick, including 2 inches of bony coal 14 inches from the top. It is overlain by bony coal 6 inches thick. The bottom bench is the main part of the bed and is 3 feet thick. It is a good blocky coal, although it contains "sulphur" bands and nodules. The bottom is fire-clay.

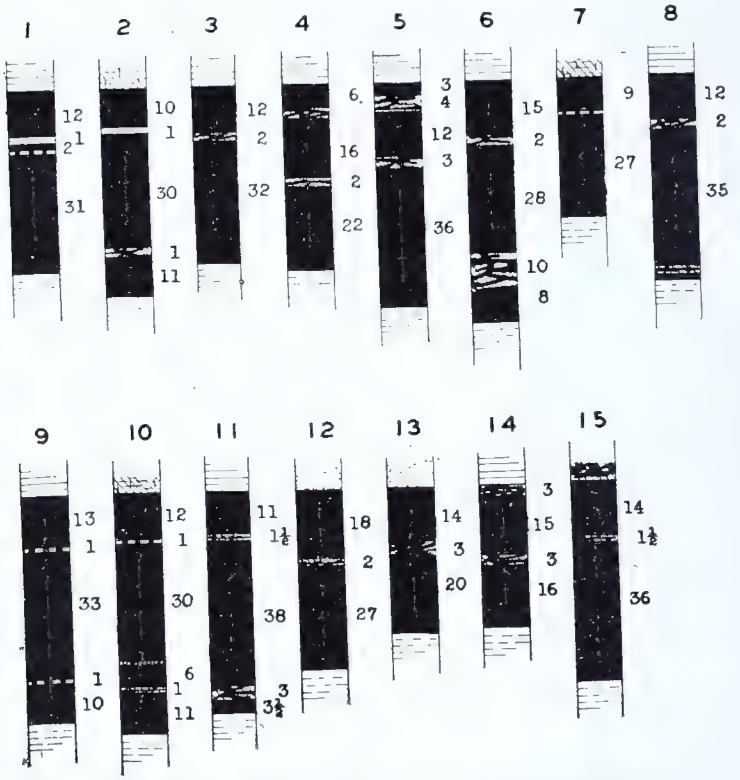


Figure 107. Sections of Brookville coal in Jefferson County.

1. Allegheny River Mining Company. Conifer No. 5 mine, at Conifer, Beaver township.
2. Allegheny River Mining Company. Conifer Nos. 1, 3 and 4 mines, at Conifer, Beaver township.
3. Allegheny River Mining Company. Hunts Run mine, ½ mile southwest of Norman Junction, Rose township.
4. Waldorf Coal & Mining Company. Waldorf No. 2 mine, 1 mile northwest of Summerville, Clover township.
5. Carrier Bros. Coal Company. Pleasant Grove mine, 1 mile northwest of Summerville, Clover township.
6. W. R. Calverly, Inc. Dayton No. 10 mine, at Summerville, Clover township.
7. Viaduct Coal Company. Viaduct mine, 5 miles west of Brookville, on N. Y. C. & H. R. R., Clover township.
8. McCullough Coal Company. Coder No. 5 mine, 3½ miles west of Brookville on N. Y. C. & H. R. R., Clover township.
9. Yates Coal Company. Yates mine, ½ mile north of Norman Station, Knox township.
10. Pawnee Coal Company. Pawnee mine, at Norman Station, Knox township.
11. Meadow Coal Company. Meadow No. 1 mine, 8 miles south of Brookville on P. & S. R. R., Knox township.
12. Ramsey & Smith. Ramsey mine, on north bank of Sandy Creek, 7 miles west of Reynoldsville, Knox township.
13. Stewart Coal Company. Black Prince No. 1 mine, on north bank of Sandy Creek, 6 miles west of Reynoldsville, Knox township.
14. Kane Brick & Tile Company. Meredith mine, on south bank of Sandy Lick Creek, 5½ miles west of Reynoldsville, Pine Creek township.
15. Panther Run Coal Company. Panther Run mine, 4 miles northeast of Reynoldsville, Washington township.

Clarion (A′) Coal.

The Clarion coal, lying about 30 feet above the Brookville, is deep under cover in the southeastern part of Jefferson County. It has been drilled through, but its commercial value is not exceptionally good. It outcrops in the central and northern townships of Jefferson County, particularly along Sandy Lick Creek. It has been opened at numerous points for domestic fuel, but its commercial development is limited to Clover township. In this township the bed ranges from 3 to 4 feet thick, averaging 3 feet 6 inches. The bed occurs in three or more benches, separated by "sulphur" and bone partings and binders ¼ inch to 3 inches thick. Locally the coal occurs in two benches, particularly along the New York Central Railroad between Heidrick Junction and Brookville. In this vicinity the top bench ranges from 1 foot 7 inches to 2 feet 2 inches thick. The "sulphur" parting is ½ to 1 inch thick. The bottom bench ranges from 10 inches to 1 foot 9 inches thick.

North of Summerville the coal varies much in physical character and occurs in three or four benches. The partings are not persistent in position in the bed.

The Clarion coal appears to thin eastward although there are several local areas in Rose, Pine Creek, and Washington townships where the Clarion may be mined commercially. In these localities the bed averages approximately 3 feet thick and is never entirely clean. The presence of pyrite bands and nodules interferes greatly with the possible future commercial value of the coal.

Lower Kittanning (B) Coal.

The Lower Kittanning coal, occurring 90 feet above the Brookville, is deep under cover in the southeastern townships of Jefferson County. It outcrops in the western line of townships and the township bordering on Sandy Lick and Bear creeks. The greatest commercial value of this bed at the present time is in Clover, Ringgold, Knox, and Oliver townships. It is also mined at two localities in Snyder township.

The Lower Kittanning ranges from 2 feet 6 inches to 3 feet thick in Clover township. It is characteristically separated into two benches by an impure canneloid coal 1 inch thick, 6 to 10 inches below the top of the bed. The bottom bench ranges from 2 feet to 2 feet 3 inches thick. The Lower Kittanning, although thin in this township, is very regular in thickness, and will have much future value when thicker beds of Jefferson County have been exhausted.

The Lower Kittanning is the principal commercial bed in Ringgold township. It ranges from 2 feet 6 inches to 3 feet thick. It is mined only on Pine Run.

In the vicinity of Mauk the Lower Kittanning ranges from 2 feet 8 inches to 3 feet thick. It occurs in two or three benches. When in two benches the parting is ½ inch thick and 11 inches below the top. The bottom bench is 1 foot 11 inches thick. When the bed occurs in three benches the top bench is 9 inches thick, and separated from the middle bench by a canneloid coal binder ½ to 1 inch thick. The middle bench ranges from 14 inches to 1 foot 11 inches thick. The bottom bench, 2 inches thick, is separated from the middle bench by a shale parting ¼ inch thick.

In the vicinity of Dora and Timblin the coal ranges from 2 feet 10 inches to 3 feet thick. The coal occurs in two benches. The top bench is 9 inches thick and separated from a middle bench, 1 foot 8 inches to 2 feet 1 inch thick, by a canneloid coal binder ½ inch thick. This binder is not cleaned from the coal in some mines. The coal in the Lower Kittanning bed in this area is much lower in sulphur than the Brookville in adjoining areas.

In Knox township the Lower Kittanning ranges from 2 feet 6 inches to 3 feet thick. It characteristically occurs in two benches. The top bench ranges from 8 to 10 inches thick and is separated from the bottom bench by a canneloid coal binder ¾ to 1 inch thick. The bottom bench ranges from 1 foot 9 inches to 2 feet 1 inch thick. Locally the bed is much disturbed by rolls and clay veins.

In Oliver township the Lower Kittanning ranges from 2 feet 6 inches to 2 feet 8 inches thick. It characteristically occurs in two benches separated by a canneloid coal binder 1 inch to 1¼ inches thick. The top bench ranges from 7 to 10 inches thick. The bottom bench ranges from 1 foot 8 inches to 1 foot 10 inches thick. The coal has very good quality.

The Lower Kittanning is not being mined along its outcrop between Knox and Snyder townships. It is mined southeast of Lanes Mills in Snyder township, and ranges from 2 feet 6 inches to 2 feet 11 inches thick. It usually occurs in one bench overlain by draw slate, and underlain by fire clay. Locally a lenticular bench of coal is present below the usual fire clay bottom. This bench averages 15 inches thick and has "sulphur" bands and nodules scattered through it. It is not mined.

The Lower Kittanning coal is soft and friable, and breaks up when mined. It has a dull luster and an irregular cubical cleavage. The volatile matter ranges from 33 to 37 per cent, the fixed carbon from 46 to 57 per cent, the ash from 6 to 14 per cent, and the sulphur from 0.9 to 3 per cent.

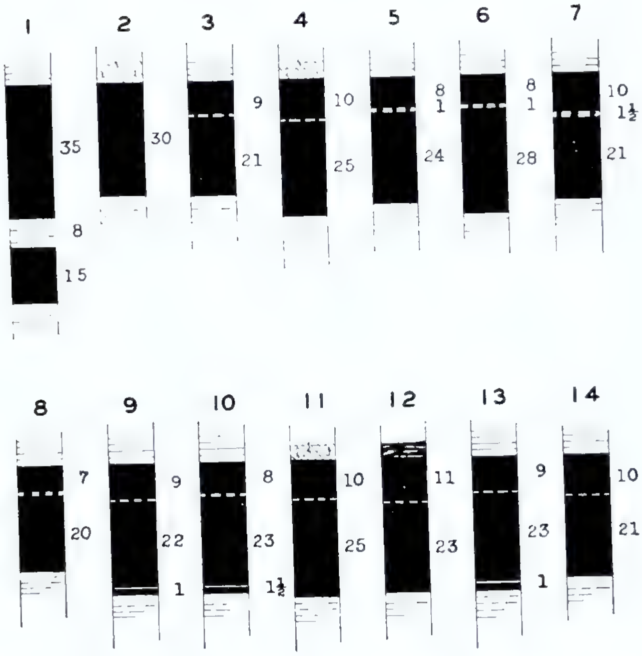


Figure 108. Sections of Lower Kittanning coal in Jefferson County.

1. Rattlesnake Coal Company. Rattlesnake mine, on Rattlesnake Creek, 2 miles south of Brockwayville, Snyder township.
2. McEwen Run Coal Company. McEwen mine, on P. R. R., 2 miles south of Brockwayville, Snyder township.
3. Norwood Coal Company. Norwood mine, ¼ mile northwest of Tait Station on P. & S. R. R., Knox township.
4. Hill Top Coal Company. Hill Top mine, ⅓ mile south of Norman on P. & S. R. R., Knox township.
5. W. R. Calverly, Inc. Carrier No. 6 mine, on L. E. F. & C. R. R., 2 miles northwest of Summerville, Clover township.
6. W. R. Calverly, Inc. Pennsy No. 5 mine, 1 mile northwest of Summerville, Clover township.
7. East Branch Coal Company. East Branch No. 2 mine, 3 miles east of Coolspring, Oliver township.
8. Oliver Coal Company. Oliver mine, ½ mile northeast of Coulter Station, on P. & S. R. R., Oliver township.
9. Ringgold Coal Company. Ringgold mine, near Timblin, Ringgold township.
10. Markle-Buller Coal Company. Markle Buller No. 1 mine, at Timblin, Ringgold township.
11. Dora Coal Company. Dora mine, ⅕ mile north of Dora, Ringgold township.
12. St. Marys Sewer Pipe Company. St. Marys Sewer Pipe No. 1 mine, near Dora, Ringgold township.
13. Sprankle Mill Coal Company. Maurer mine, near Mauk Station, Ringgold township.
14. Mauk Coal Company. Mauk mine, ¼ mile north of Mauk Station on P. & S. R. R., Ringgold township.

Middle Kittanning (C) Coal.

The Middle Kittanning lies approximately 55 feet above the Lower Kittanning coal. It outcrops on a line roughly drawn northeast-southwest through Porter, Beaver, Rose, Pine Creek, Warsaw, and Snyder townships. North of this line it has been eroded. In the southeastern part of Jefferson County it is deep under cover and little is known of its thickness and value.

The Middle Kittanning is most important in Knox township where it is mined at various localities for commercial purposes. It ranges from 2 feet 10 inches to 4 feet 2 inches thick. The principal mining district is in the vicinity of Knoxdale, and in the southern part of the township. The bed occurs in two or three benches separated by a coal and bone parting. One mile south of Knoxdale the bed is in two benches. The top is 10 inches thick, separated from a bottom bench, 1 foot 8 inches thick, by a bone parting 2 inches thick. In the immediate vicinity of Knoxdale the coal occurs in three benches separated by bone coal partings. The top bench ranges from 8 to 10 inches thick, and is separated from a middle bench, 12 inches to 1 foot 7 inches thick, by a bone coal parting 1 to 6 inches thick. The bottom coal is 5 to 8 inches thick, and is separated from the middle bench by a sulphur and bone parting $1\frac{1}{2}$ to 2 inches thick. North of Knoxdale the bed occurs in two benches separated by bone coal 6 inches thick. The top bench is 15 inches thick, and the bottom 2 feet 4 inches thick.

The Middle Kittanning is mined east of Coolspring in Oliver township. It averages 3 feet 6 inches thick. The top bench is 1 foot 10 inches thick, and is separated from a bottom bench by 4 inches of shale. The bottom bench is 12 inches thick.

The Middle Kittanning is mined in Rose township. It averages 3 feet 8 inches thick. In the vicinity of Stanton the coal occurs in two benches. The top bench is 1 foot 10 inches thick, separated from a bottom bench of the same thickness, by a shale parting. In the vicinity of McGareys the bed occurs in four benches, separated by bone coal partings $\frac{1}{2}$ to 1 inch thick. The benches have the following thickness, in ascending order: 7, 13, 12, and 10 inches.

The Middle Kittanning coal ranges from 29 to 34 per cent volatile matter, 48 to 55 per cent fixed carbon, 7 to 12 per cent ash, and 1 to 3 per cent sulphur.

Upper Kittanning (C′) Coal.

The Upper Kittanning, lying about 105 feet above the Lower Kittanning, is generally thin and unimportant in the county, although locally it is thick and mined.

In Ringgold township, on Pine Run, the coal has a maximum thickness of 2 feet 9 inches. In Union township, near Corsica, it ranges from 2 feet 6 inches to 3 feet thick, and is opened for local fuel.

The Upper Kittanning is rarely over 2 feet thick in the northern townships and is poor in quality.

It is deep under cover in large areas in the eastern and southern townships, and little is known of its quality and thickness. It is mined extensively along the Pennsylvania Railroad in Winslow and Washington townships and is persistently 2 feet thick, having a local maximum thickness of 3 feet. It carries no distinct partings or binders.

LOWER FREEPORT (D) COAL.

The Lower Freeport coal, lying 155 feet above the Lower Kittanning, and 45 feet below the Upper Freeport, is the most important coal in the county. More than fifty mines are working this bed.

The Lower Freeport is soft and friable but mines out in good sized lumps. It is a stick and block coal, with alternating bands of bright lustrous and dull coal. It ranges fom 28 to 35 per cent volatile matter, 51 to 60 per cent fixed carbon, 4 to 13 per cent ash, and 1 to 5 per cent sulphur.

The Lower Freeport occurs only in isolated areas north of Sandy Lick Creek. It underlies practically three-fourths of the territory south of Sandy Lick Creek in Jefferson County.

In Snyder township the Lower Freeport coal ranges from 2 feet 8 inches to 4 feet thick, averaging approximately 3 feet.

North and northwest of Brockwayville the Lower Freeport ranges from 2 feet 10 inches to 3 feet 3 inches thick. It is overlain by draw slate 4 to 6 inches thick. Locally a bony bench, 3 inches thick, is present below the draw slate. The main bed of coal ranges from 2 feet 8 inches to 2 feet 10 inches thick. It is soft and friable and contains some "sulphur" streaks and bone lenses. Locally a lower bench is present, 7 inches thick, and is separated from the main bench by a bone binder 1 inch thick.

South and southeast of Brockwayville the Lower Freeport ranges from 2 feet 8 inches to 3 feet 8 inches thick. It occurs in a single bench overlain by draw slate or bony coal. The main bench of coal ranges from 3 feet 4 inches to 3 feet 8 inches thick. It is a coal of medium hardness, and is blocky if it is properly undermined and blasted. Locally a bottom bench, 18 inches thick, is present but is too impure to be mined because it has a great number of "sulphur balls" and bone partings scattered through it. The bottom is fire clay.

In the immediate vicinity of Brockwayville the Lower Freeport is 3 feet 8 inches thick. The coal locally contains pyrite streaks and bone lenses but none are extensive. The bed is overlain by 4 inches of bony coal. The bottom is fire clay.

The Lower Freeport is present only in small isolated areas in Washington township. It is mined principally in the vicinity of Coal Glen where it averages 3 feet 10 inches thick. It occurs in a single bench containing some pyrite streaks and knife blades of bone. The bed contains some clay veins and spars. Locally the coal is replaced by sandstone. Three inches of bone coal are present above the bed. The bottom is fire clay.

One of the principal mining districts of Jefferson County is in Winslow township in the vicinity of Reynoldsville. The coal has been preserved in the Reynoldsville basin in this area. The Lower Freeport has been mined extensively for a great many years and is well known by the trade name—Reynoldsville Basin Coal. The bed is extremely variable in physical character. Partings and binders are present in some mines and are lacking in others; in some areas there are bony benches at the top and bottom. The bed ranges from 3 to 8 feet thick, averaging 4 feet of clean coal.

South of Reynoldsville the bed averages approximately 5 feet thick and is overlain by bone coal 8 inches thick. One bone parting, approximately 1 inch thick, is present 10 inches above the bottom.

At Wishaw the coal is 4 feet thick overlain by 6 inches of bone coal. A 1-inch bone binder is present 8 inches above the bottom. Practically the same physical character exists in the vicinity of Reynoldsville.

Probably the greatest thickness of the Lower Freeport coal in Jefferson County is in Henderson township, between Big Run and Desire. Here the bed is locally 13 feet 8 inches thick, including a 2-foot shale parting, 2 feet from the top of the bed. At Eleanora it ranges from 3 to 8 feet thick. It is clean where 3 feet thick, but the greater measurement includes a bone parting 1 to 2 inches thick, about 10 inches from the bottom, and 8 inches of bony coal at the top. The Lower Freeport is mined extensively at Sykesville, where it is 5 to 6 feet thick, including a bone parting 1 to 2 inches thick, 8 to 10 inches from the bottom. The top coal is also bony in places.

In McCalmont township fourteen commercial mines are working the Lower Freeport. The bed ranges from 3 feet 6 inches to 6 feet thick. In the eastern part of the township the Lower Freeport ranges from 3 feet 5 inches to 6 feet thick. It has a characteristic bone parting, 1 inch thick, 8 inches from the bottom. The bed is overlain by 8 to 10 inches of bone coal which is taken down in mining. The coal mines out in fair sized lumps. The bone is separated easily by picking.

In the western part of McCalmont township the bed ranges from 3 to 6 feet thick. The maximum thickness is just north of Anita. Locally the bed is entirely clean but usually it has a 1-inch bone parting 5 to 9 inches above the bottom. A local coal bench is present in the vicinity of Florence. It is 1 inch thick and separates the main bed of coal from a bottom bench 18 inches thick. At this locality the main bench is 6 to 7 feet thick.

The Lower Freeport coal ranges from 2 feet 6 inches to 6 feet thick in Gaskill township. It is usually free from partings and binders, but in some places is split into two benches by an 8-inch shale parting about 12 inches from the bottom.

The Lower Freeport has been mined extensively for many years at Anita, Adrian, Horatio, Walston, and Punxsutawney in Young township. At Adrian the Lower Freeport is 5 feet thick, including a 1-inch bone parting 8 inches above the bottom. The bed is overlain by 10 inches of bone coal. The bottom is fire clay. The bed contains a few clay veins and sandstone faults.

In the vicinity of Walston and Lindsey the Lower Freeport is 4 feet thick, including a 1 inch bone binder 6 inches above the bottom. The bed is overlain by 8 inches of bony coal.

In the vicinity of Horatio the coal ranges from 3 feet 8 inches to 5 feet 10 inches thick. Where thinnest a bone binder is present 6 inches above the bottom; where thickest this binder is 16 inches above the bottom. The bed is overlain by 10 to 12 inches of bone coal.

The Lower Freeport is mined extensively on Mahoning Creek and in the vicinity of Frostburg in Perry township. At Frostburg the Lower Freeport averages 4 feet 6 inches thick, including a bone parting 1 to 2 inches thick 6 inches above the bottom. The bed is overlain by bone coal 7 inches thick on Mahoning Creek east of Fordham. The coal averages 3 feet 4 inches thick, including a 1 inch bone parting 3 to 6 inches above the bottom. The top is bone coal. In the vicinity of Fordham the Lower Freeport ranges from 4 feet 2 inches to 5 feet 8 inches. It contains only one persistent impurity in the form of a bone parting 1 to 2 inches thick, 8 to 18 inches above the bottom. The roof is bone coal; the bottom fire clay.

West of Fordham along Mahoning Creek, in the vicinity of Hamilton P. O., the Lower Freeport is 5 feet thick. The bed contains a characteristic parting, 1 inch thick, 8 to 12 inches from the bottom. A local bone parting, ½ to 1 inch thick, occurs 6 to 8 inches above the top. The bed is subject to roof rolls in this vicinity. Clay veins are frequent and rock faults occur in some mines.

North of Hamilton P. O. the bed thins to 4 feet. It is regular in thickness and contains no distinct impurities.

The Lower Freeport is mined at a few places in Oliver township. In the vicinity of Oliveburg it is 5 feet thick, including a 2-inch bone parting 8 inches above the bottom. In an isolated area in the northern part of Oliver township the Lower Freeport is 5 feet 6 inches thick, including a shale or bone band, 1 inch thick, 5 inches below the top.

The Lower Freeport is mined at several localities in Knox township. It ranges from 3 to 5 feet thick. In the eastern part of the township it averages 4 feet 2 inches and has no distinct bone partings in it although "sulphur" streaks and knife blades of bone are prevalent. Clay veins and spars split the bed. In the vicinity of Knoxdale the coal ranges from 4 to 5 feet thick. Where thinnest it occurs in a single bench overlain by bone coal; where thickest a 2-inch parting of bone is present 6 to 8 inches above the bottom.

In the vicinity of Ramsaytown, in Knox township, the coal averages 4 feet thick and varies much in physical character. It occurs in two to four benches separated by bone coal partings ranging from ½ inch to 3 inches thick. "Sulphur" lenses are prevalent.

The Lower Freeport is being mined commercially at one point along Sandy Lick Creek in the eastern part of Pine Creek township. It averages 5 feet 8 inches thick. The main bench, 5 feet thick, is overlain by bony coal. A 2-inch bone parting is present 3 inches above the bottom. Locally an 8-inch bench of good coal occurs below the main bench and is separated from it by a 2-inch bone parting.

The Lower Freeport is not being mined commercially in the townships bordering Armstrong and Clarion counties.

In Porter township it ranges from 3 feet 2 inches to 6 feet 6 inches thick. Its area is limited because erosion has removed the upper part of the Allegheny group.

The Lower Freeport is variable in thickness in Ringgold township, reaching a maximum of 5 feet. Its average is much less.

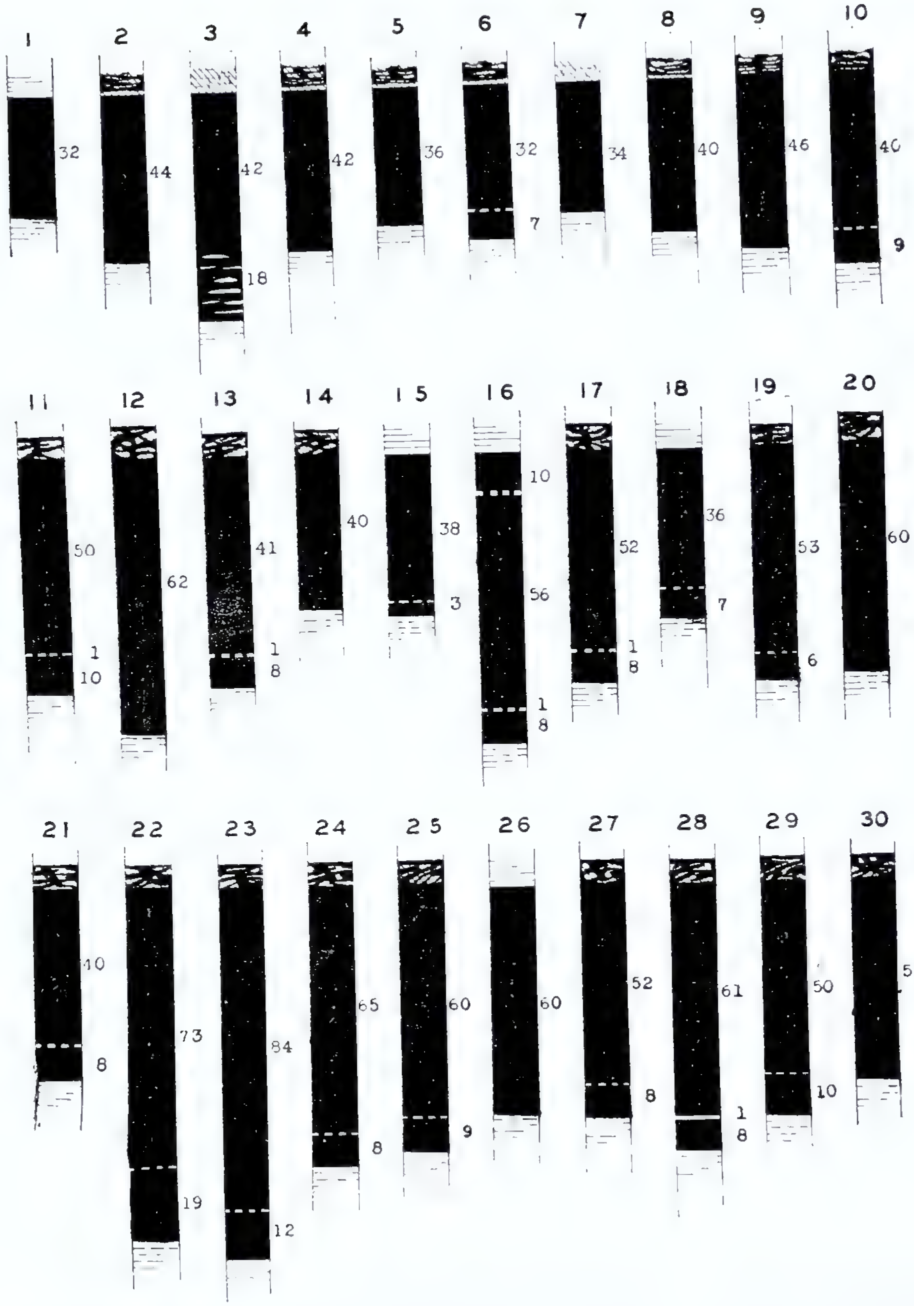


Figure 109. Sections of Lower Freeport coal in Jefferson County.

1. McEwen Run Coal Company. Lane mine, 2 miles southeast of Brockwayville, Snyder township.
2. McKnight Coal Company. McKnight No. 1 mine, at Brockwayville, Snyder township.
3. Toby Coal Mining Company. Groves No. 1 mine, 1½ miles southeast of Brockwayville, Snyder township.
4. Northwestern Mining and Exchange Company. Granville mine, 1½ miles south of Brockwayville, Snyder township.
5. W. A. Keys Coal Company. Pine Grove mine, ¼ mile north of Brockwayville, Snyder township.
6. W. A. Keys Coal Company. Logue mine, 1 mile northwest of Brockwayville, Snyder township.
7. Beadle & McCauley Coal Company. Beadle & McCauley mine, 2 miles north of Brockwayville, Snyder township.

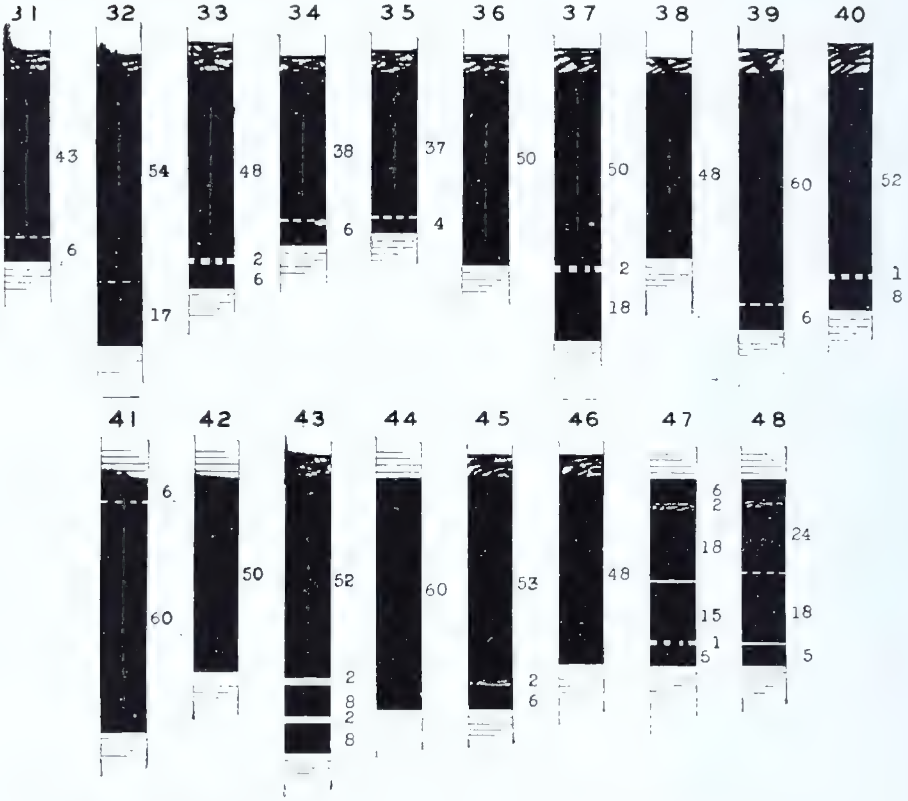


Figure 110. Sections of Lower Freeport coal in Jefferson County.

8. Hunter Coal Company. Hunter mine, 5 miles southwest of Brockwayville, near Coal Glen, Washington township.
9. Jefferson Coal Company. Coal Glen No. 8 mine, at Coal Glen, Washington township.
10. Jefferson & Clearfield Coal & Iron Company. Trout Run No. 1 mine, at Wishaw, Winslow township.
11. Jefferson & Clearfield Coal & Iron Company. Soldier Nos. 1 & 2 mines, on Reynoldsville & Falls Creek branch. 4 miles southeast of Reynoldsville, Winslow township.
12. Northwestern Mining & Exchange Company. Sykes mine, ½ mile west of Sykesville, Henderson township.
13. Cascade Coal & Coke Company. Sykesville mine, at Sykesville, Henderson township.
14. Northwestern Mining & Exchange Company. Cramer mine, at Cramer, Henderson township.
15. Rochester & Pittsburgh Coal & Iron Company. Eleanora shaft, 3 miles northwest of Big Run, McCalmont township.
16. Rochester & Pittsburgh Coal & Iron Company. Eleanora No. 2 mine, at Eleanora, McCalmont township.
17. Ira S. Smith. Smith No. 1 mine, at Eleanora, McCalmont township.
18. Straitwell Coal Company. Straitwell No. 1 mine, 3 miles west of Anita, McCalmont township.
19. Cortez Coal Company. Cortez No. 1 mine, 2½ miles west of Anita, McCalmont township.
20. Noerr Coal Company. Noerr No. 1 mine, 3 miles west of Anita, McCalmont township.
21. Anita Coal Mining Company. Anita No. 1 mine, 2 miles west of Anita, McCalmont township.
22. Rochester & Pittsburgh Coal & Iron Company. Florence No. 2 mine, at Florence, McCalmont township.
23. Rochester & Pittsburgh Coal & Iron Company. Florence No. 1 mine, at Florence, McCalmont township.
24. Elk Run Mining Company. Maude No. 1 mine, at Florence, McCalmont township.

25. S. A. Rinn Company. Adrian No. 5 mine, at Harmony, Young township.
26. Carrick Coal Company. Carrick mine, 2 miles northwest of Harmony, Young township.
27. Rochester & Pittsburgh Coal & Iron Company. Adrian No. 1 mine, at Delancey, Young township.
28. Rochester & Pittsburgh Coal Company. Walston No. 2 mine, at Walston, Young township.
29. Rowan Coal Company. Rowan mine, near Walston, 3 miles northwest of Punxsutawney, Young township.
30. Williams Run Coal Mining Company. Williams Run No. 1 mine, 1 mile west of Punxsutawney, Young township.
31. Williams Run Coal Mining Company. Williams Run No. 3 mine, 1 mile west of Lindsey, Young township.
32. Anita Coal Mining Company. Anita No. 2 mine, at Horatio, Young township.
33. Frostburg Coal Company. Frostburg No. 6 mine, at Frostburg, Perry township.
34. Lindsey Coal Mining Company. Lindsey No. 8 mine, at Munsdorf, Perry township.
35. Ross Run Coal Company. Ross No. 1 mine, 1 mile west of Munsdorf, Perry township.
36. Fordham Coal Mining Company. Fordham Nos. 1 and 2 mines, at Valier, Perry township.
37. Service Coal Mining Company. Vega mine, at Fordham Station, Perry township.
38. Perry Hill Coal Company. Perry Hill Nos. 1 and 2 mines, 1 mile north of Hamilton, Perry township.
39. Jefferson Fuel Company. Perry No. 1 mine, 1 mile west of Valier, Perry township.
40. Geo. W. Smith. Smith mine, at Oliveburg, Oliver township.
41. Helena Coal Company. Helena mine, near Conifer, in northwestern part of Oliver township.
42. Stewart Coal Company. Black Prince No. 2 mine, on Sandy Lick Creek, 7 miles west of Reynoldsville, Knox township.
43. G. O. Schuckers. Schuckers mine, on Sandy Lick Creek, 5 miles west of Reynoldsville, Knox township.
44. Hopkins and Fike Coal Company. Fike No. 1 mine, ½ mile north of Knoxdale, Knox township.
45. Swan Coal Company. Swan mine, 1½ miles north of Knoxdale, Knox township.
46. Stewart Coal Company. Stewart No. 1 mine, ¼ mile southeast of Tait Station, Knox township.
47. Ramsay Coal Company. Ramsay B mine, ¼ mile northeast of Ramsaytown, Knox township.
48. Shawmut Mining Company. Ramsay No. 2 mine, ⅓ mile southwest of Ramsaytown Station, Knox township.

UPPER FREEPORT (E) COAL.

The Upper Freeport coal, lying about 45 feet above the Lower Freeport, is very irregular in thickness and variable in quality In some places it is a fine bed of coal.

The Upper Freeport is mined extensively in Snyder township. It ranges from 2 feet 2 inches to 4 feet 4 inches thick. It averages less than 3 feet. In the northeastern part of the township the bed averages 2 feet 10 inches thick. It does not carry any persistent bone or shale partings, but has "sulphur" streaks scattered through it. The bed is overlain by 4 inches of draw slate.

In the vicinity of Brockwayville the coal averages 2 feet 4 inches thick and occurs in a single bench containing some local sulphur bands. The coal is overlain by draw slate. North of Brockwayville the coal has a maximum thickness of 4 feet 4 inches, and is separated into two benches by a 2-inch bone parting 16 inches above the bottom. The top bench of coal is 3 feet thick. The bed is overlain by 6 inches of bone.

In the southern part of the township the Upper Freeport coal averages 2 feet 2 inches thick, and occurs in a single bench. The coal is of medium hardness, and when properly mined it is shipped in fair sized lumps.

In Washington township the Upper Freeport is being mined only in Coal Glen district where it averages 3 feet 10 inches thick, and has a maximum thickness of 4 feet 4 inches. It locally occurs in a single bench containing some "sulphur" streaks and thin bone partings. In some localities, particularly where the bed is thickest, it is divided into two benches by a shale parting, 2 inches thick, 12 inches above the bottom.

The Upper Freeport coal has not been mined extensively in Winslow township. It averages about 3 feet thick, but is dirty and rather high in sulphur. When the Lower Freeport coal is exhausted, it will be mined more.

In McCalmont township the Upper Freeport ranges from 2 feet 4 inches to 3 feet 10 inches thick, averaging 3 feet 5 inches. The coal has only one persistent parting which is 1 inch thick and 6 inches above the bottom.

The Upper Freeport is being mined at a few places in Henderson township for local fuel. The bed ranges from 2 feet 4 inches to 4 feet 2 inches thick. It varies much in quality locally, and practically everywhere contains pyrite nodules and thin bone partings. There are no partings or binders which are extensive in large areas.

The Upper Freeport is mined extensively in Gaskill township, especially along Mahoning Creek. In this vicinity it ranges from 2 feet 4 inches to 3 feet thick, averaging 2 feet 10 inches. The coal occurs in a single bench, is soft, and exceptionally clean. In the southeastern part of the township the coal averages 2 feet 6 inches, occurs in a single bench, and is very clean. Along the Pennsylvania Railroad, in the southwestern part of the township, the bed ranges from 3 feet to 4 feet 2 inches thick. At this locality the bed generally occurs in a single bench, but is locally separated into two benches by a 2-inch bone binder 8 inches from the bottom. This binder is hard to separate from the coal.

Near Hillman the bed is 2 feet 10 inches thick, including a thin bone parting.

In Bell township the Upper Freeport coal ranges from 2 feet 9 inches to 4 feet 6 inches thick, averaging 4 feet. It is being mined in the southeastern part of the township in the vicinity of Elbel, where it is 3 feet 6 inches thick. The coal occurs in a single bench and is overlain by 8 inches of bony coal. The Upper Freeport is mined on Mahoning Creek just east of Bells Mills by shaft 156 feet deep. The coal is 4 feet thick, and is separated into two benches by a bone binder, 1 to 3 inches thick, 8 inches above the bottom. The bone is easily separated by hand.

At Anita, in Young township, the Upper Freeport averages 3 feet of good clean coal. It is 3 feet 6 inches thick at Punxsutawney, not including a bony bench at the top, usually 8 inches thick. The bed has a maximum thickness of 6 feet in this township, but invariably carries numerous knife blades of pyrite and bone, making the coal much inferior to the Lower Freeport.

The Upper Freeport varies greatly in thickness in Perry township, but is locally good thick coal, with a maximum thickness of 5 feet. Thin bone partings are prevalent in the bed making its commercial value less than the Lower Freeport. The Upper Freeport is not being mined on a commercial scale in this township.

In Porter township the Upper Freeport generally is thin but it is of minable thickness on Pine Creek, where it is mined at two or three localities.

In the vicinity of Timblin the coal is 4 feet thick, but is very irregular. "Sulphur" nodules are scattered through the coal. Locally the bed is separated into two benches by a 1½-inch bone binder 10 inches above the bottom.

In Ringgold township the Upper Freeport coal is being mined only on Pine Creek, where it has the same physical character as it has south of Pine Creek in Porter township. Locally the coal occurs in three benches separated by two ¼-inch pyrite partings.

The Upper Freeport has been eroded in the northern and western townships of Jefferson County.

The Upper Freeport coal is soft and friable, and breaks up when mined. It has a dull luster, and an imperfect cubical fracture. The volatile matter ranges from 28 to 35 per cent, the fixed carbon from 53 to 59 per cent, the ash from 4 to 12 per cent, and the sulphur from 1 to 4 per cent.

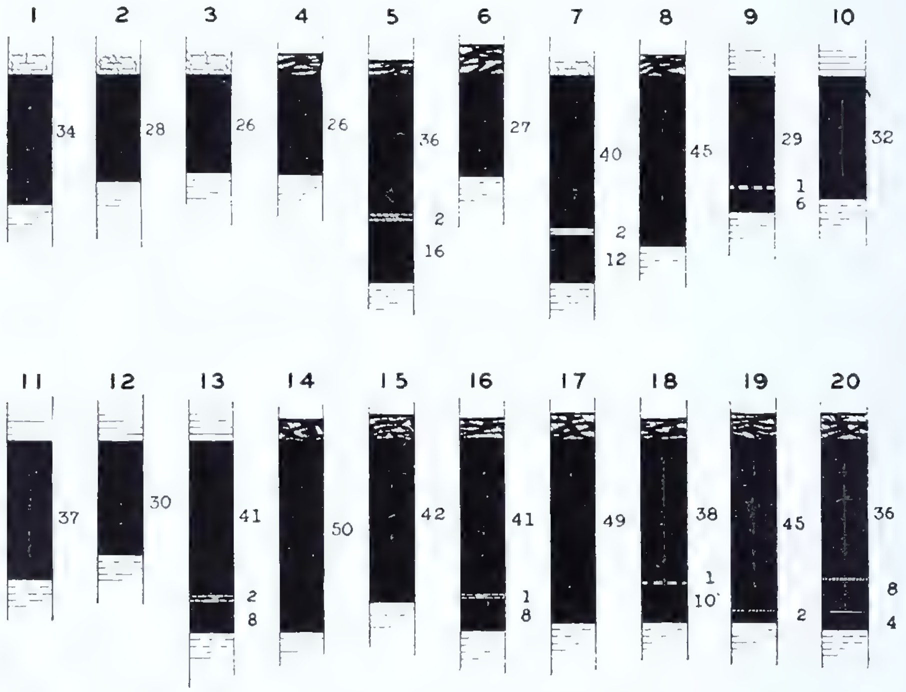


Figure 111. Sections of Upper Freeport coal in Jefferson County.

1. Frederick Coal Company. Frederick No. 2 mine, 4 miles east of Brockwayville, on Erie Railroad, Snyder township.
2. Britton & Kearney. Brockway mine, 1 mile southwest of Brockwayville, Snyder township.
3. Britton & Kearney. Brockway mine, 1 mile southwest of Brockwayville, Snyder township.
4. Brock Coal Company. Brock mine, 2 miles southeast of Brockwayville, Snyder township.
5. McConnell Coal Company. Beechton mine, on P. & S. R. R., 3 miles northwest of Brockwayville, Snyder township.
6. Toby Coal Mining Company. Groves No. 2 mine, on B. R. & P. R. R., 1½ miles southeast of Brockwayville, Snyder township.
7. McConnell Coal Company. Black Nos. 1 and 2 mines, at Coal Glen, Washington township.
8. Jefferson Coal Company. Coal Glen No. 9 mine, at Coal Glen, Washington township.
9. Elk Run Coal Mining Company. Maude No. 1 mine, at Florence, McCalmont township.
10. McClure Mining Company. McClure mine, 1 mile north of Big Run, Gaskill township.
11. McClure and Tyson Coal Company. Big Run Nos. 1, 2 & 3 mines, at Big Run, Gaskill township.
12. Clover Run Coal Mining Company. Arthur No. 1 mine, 2 miles northeast of Hillman, Gaskill township.
13. Bowersville Coal Mining Company. Bowersville No. 1 mine, on P. R. R. near Hillman, Gaskill township.
14. Hudson Coal Mining Company. Winslow mine, at Winslow, Gaskill township.
15. Sawyer Coal Company. Sawyer mine, ½ mile east of Elbell, Gaskill township.
16. Onondaga Coal Mining Company. Onondaga mine, on Mahoning Creek near Bells Mills, 3 miles east of Punxsutawney, Bell township.
17. Gilbert Coal Company. Gilbert No. 1 mine, 1 mile east of Timblin, Porter township.
18. Mill Coal Company. Mill Coal No. 1 mine, at Timblin, Porter township.
19. Corbett Mining Company. Eagle Valley mine, 1 mile northeast of Timblin, Ringgold township.
20. Timblin Coal Company. Timblin mine, ½ mile northeast of Timblin, Ringgold township.

MAHONING COAL.

The Mahoning coal, lying about 75 feet above the Upper Freeport, is present only in limited areas in the southern part of the county. It averages less than 12 inches thick, and has a maximum thickness of 2 feet. It has never been opened.

There are two or three other beds of coal that average less than 4 inches thick.

CHAPTER XVIII.

LAWRENCE COUNTY

INTRODUCTION

Although Lawrence County contains thirteen coal beds that are locally workable, their areas are small, and their quality is so variable that the county is not an important producer.

Lawrence County has good railroad facilities. The Pennsylvania Railroad follows the valley of Beaver River to Lawrence Junction, where one branch goes northwest to Youngstown, Ohio, and the other to New Castle, Sharon, and north. Another branch runs northeast from New Castle along the valley of Neshannock Creek to the northern edge of the county. The Pittsburgh and Lake Erie and the Baltimore and Ohio railroads follow Beaver Valley across the county; the Erie Railroad runs from Sharon to New Castle. The Western Allegheny Railroad, entering the eastern side of the county at Grant City, extends west to Beaver River below New Castle Boro. The New Castle and Butler Railroad has several short branches northeast of New Castle.

Lawrence County has many miles of improved roads as well as good dirt roads. The highways are not used much for the transportation of coal.

The northern part of Lawrence County shows plainly the effect of glacial action. The surface is rolling; there are no hills or knobs with steep slopes; there are no deeply intrenched streams, and the valleys and flats are covered with many feet of glacial drift. The southern part of the county, below the terminal moraine, is decidedly hilly. The streams have deeply intrenched themselves in valleys with steep slopes, having massive sandstone outcrops. Steep hills are numerous. Three terraces are well-developed along the larger drainage basins.

The rocks in the county lie nearly flat; locally they dip gently northward.

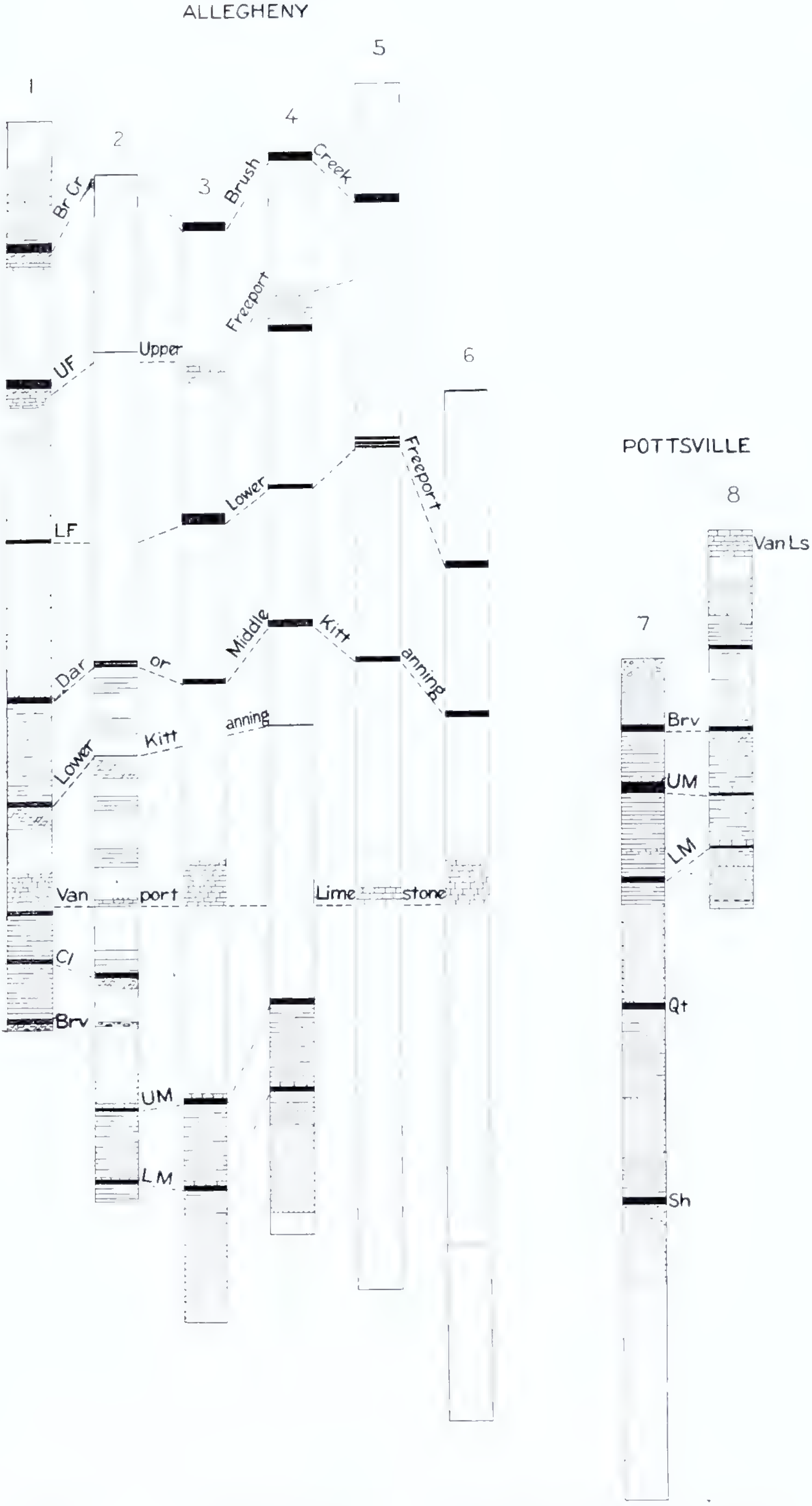


Figure 112. Stratigraphic sections, Lawrence County.

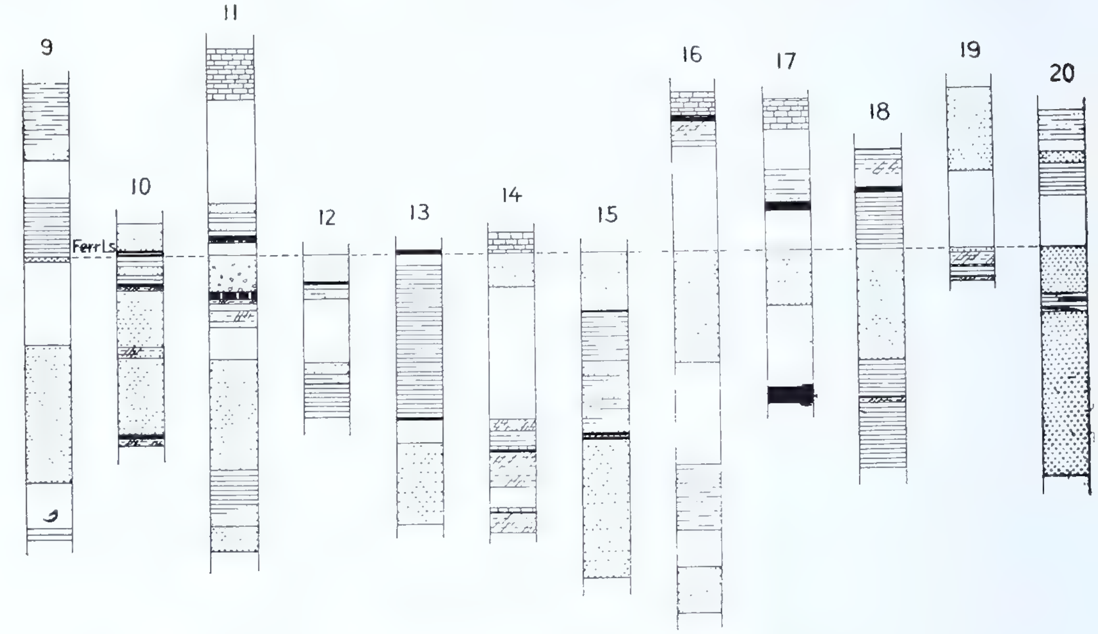


Figure 113. Stratigraphic section cont'd. Lawrence County.

1. Generalized section of the Allegheny group in Lawrence County. Pennsylvania Second Geological Survey, Rept. QQ, p. 22.
2. Section at Wurtemburg. Pennsylvania Second Geological Survey, Rept. QQ, p. 76.
3. Section in northern Perry Township. Pennsylvania Second Geological Survey, Rept. QQ, p. 82.
4. At Slippery Rock. Pennsylvania Second Geological Survey, Rept. QQ, p. 86.
5. Section in northern Wayne Township. Pennsylvania Second Geological Survey, Rept. QQ, p. 92.
6. Section in eastern Big Beaver Township. Pennsylvania Second Geological Survey, Rept. QQ, p. 111.
7. Typical section of Pottsville in Lawrence County. Pennsylvania Second Geological Survey, Report QQ, p. 52.
8. Section on eastern line of Taylor Township. Pennsylvania Second Geological Survey, Rept. QQ, p. 141.

*9. Opposite the mouth of Connoquenessing Creek, Big Beaver township.
10. East bank of Big Beaver River, 1¾ miles southeast of Chewtown, Wayne township.
11. Quarry in Vanport limestone on east bank of the Beaver, 1½ miles southeast of Chewton, Wayne township.
12. Along highway about ¼ mile south of Wampum, Big Beaver township.
13. ¾ mile south of New Castle Junction, Taylor township.
14. ¾ mile east of Mahoningtown in Taylor township.
15. Sandstone quarry on east bank of Neshannock Creek about 1¾ miles northeast of New Castle in Hickory township.
16. About ¾ mile northeast of Section No. 15.
17. 1 mile west-southwest of Eastbrook Station, Neshannock township.
18. Along the highway about 2¼ miles north-northeast of Coaltown in Neshannock township.

*Sections 9 to 18 inclusive measured by B. Coleman Renick.

COALS.

SHARON COAL.

The Sharon coal, which has been an important bed in Mercer County, is very thin in Lawrence County, and is rarely minable. The coal is dirty and has none of the characteristics it displays a few miles to the north.

QUAKERTOWN COAL.

The Quakertown coal is thin, averaging less than 12 inches but is persistent. At a few points it is minable. In the vicinity of Quakertown Run the coal has a maximum thickness of 3 feet and has been mined for domestic fuel. The coal tends to be of the blocky variety; it is high in ash, sulphur, and volatile matter. The fixed carbon is low.

LOWER MERCER COAL.

The Lower Mercer coal bed is thin and is rarely minable. It is very persistent, but is very shaly and pyritous. The coal is thickest, 3 feet, in the Neshannock Valley and in the vicinity of New Wilmington. The average is much less. In places a few inches at the bottom is canneloid coal.

UPPER MERCER COAL.

The Upper Mercer coal is not of commercial importance in the county. Its horizon is marked by a few inches of clean coal, or many feet of coal so dirty that it cannot be mined profitably.

A thin and impure coal appears locally a few feet below the Homewood sandstone. It has been mined for domestic use in the absence of better coal.

BROOKVILLE (A) COAL.

The Brookville coal, lying directly upon, or a few feet above the Homewood sandstone, is rarely minable and in places is entirely absent. It has been mined in the northern part of the county, where it is locally 3 feet 6 inches to 4 feet thick, with one bone or pyrite parting a few inches from the top. The coal is clean and of good quality, although its thickness does not warrant production in many places.

CLARION (A′) COAL.

The Clarion coal is rarely minable in the county. It is locally 18 inches thick, but averages about 6 inches.

KITTANNING COALS.

The correlation of the Kittanning group of coals in Lawrence County is uncertain. Two of these coals are generally thin and unimportant. A third, locally known as the Darlington coal, is probably the Middle Kittanning. It is the most important bed in the county.

The Lower Kittanning is not being mined on a commercial scale in Lawrence County, but has been used on the farms and in generating steam under boilers for drilling oil and gas wells.

In Wayne township the bed is thin, averaging approximately 18 inches. It is cannel in character. Probably the greatest thickness of the Lower Kittanning is in Little Beaver township in the vicinity of Enon Valley. In this locality the bed ranges from 2 feet to 3 feet 10 inches thick. It is generally free from partings and binders, but locally contains a ½-inch bone binder 11 to 12 inches above the bottom.

In North Beaver township the coal is thin, averaging approximately 2 feet, but at most localities it is coal of excellent quality free from any distinct partings and binders.

Outcrops of the Lower Kittanning in the other townships of Lawrence County indicate that it is entirely too thin to be of commercial importance in the next decade.

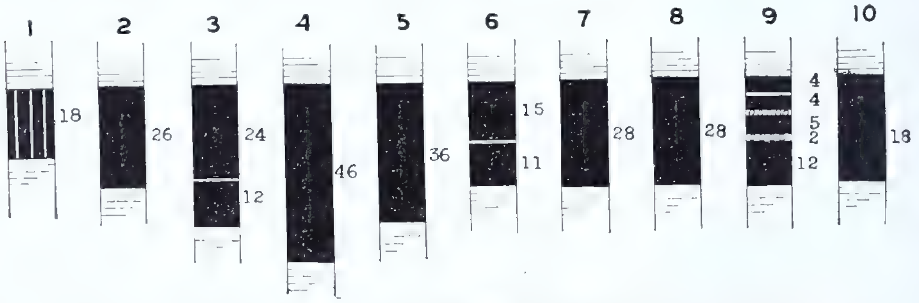


Figure 114. Sections of Lower Kittanning coal in Lawrence County.

1. Outcrop on hill, 1 mile south of Chewton, Wayne township.
2. Outcrop 1 mile east of Enon Valley, Little Beaver township.
3. Outcrop on Little Beaver Creek, 1½ miles northwest of Enon Valley, Little Beaver township.
4. Outcrop on Little Beaver Creek, 1 mile northwest of Enon Valley.
5. Outcrop on Honey Creek, 2 miles northwest of Enon Valley.
6. Outcrop 1 mile southeast of Mountair, Little Beaver township.
7. Outcrop 1½ miles northwest of Mountair, North Beaver township.
8. Outcrop on North Branch of Honey Creek, 4½ miles northwest of Enon Valley, Little Beaver township.
9. Outcrop 2 miles southwest of Mount Jackson, North Beaver township.
10. Outcrop 1½ miles west of Mount Jackson, North Beaver township.

The Darlington, which is probably the Middle Kittanning, is mined commercially at approximately three localities in the county. Most of the coal is used locally for burning lime and under the boilers of cement manufacturing plants. In some of its area it is a genuine block coal, resembling very much the Sharon block coal of Mercer County, which was so celebrated in the early 80's for use in blast furnaces. The outcrop of the Darlington is quite extensive in Wayne township. The bed averages less than 2 feet thick, is entirely clean in most localities, and may be of future commercial value. Probably its maximum thickness is in the vicinity of Hazeldell in Wayne township. Here it ranges from 2 feet 10 inches to 3 feet 4 inches thick.

The outcrop of the Darlington has been measured at numerous localities in Shenango township, and its physical characters resemble very much those observed in Wayne township. A very persistent shale parting 1 to 4 inches thick, 3 to 4 inches above the bottom, characterizes the bed.

The Darlington coal is mined at two or three localities in Slippery Rock township for local use. Its physical character is extremely variable, and its thickness may be characterized by the term "potty vein."

The Darlington has its greatest commercial value in Big Beaver township, where it is persistently 2 feet 4 inches to 2 feet 10 inches thick. A characteristic bone parting is present 4 to 5 inches above the bottom. In addition, one or two other bone, shale, or "sulphur" binders are present near the middle of the bed.

The Darlington is a high-volatile coal which locally is cannel. Although it is almost prohibitively thin its excellent quality enables operators to work it at a profit.

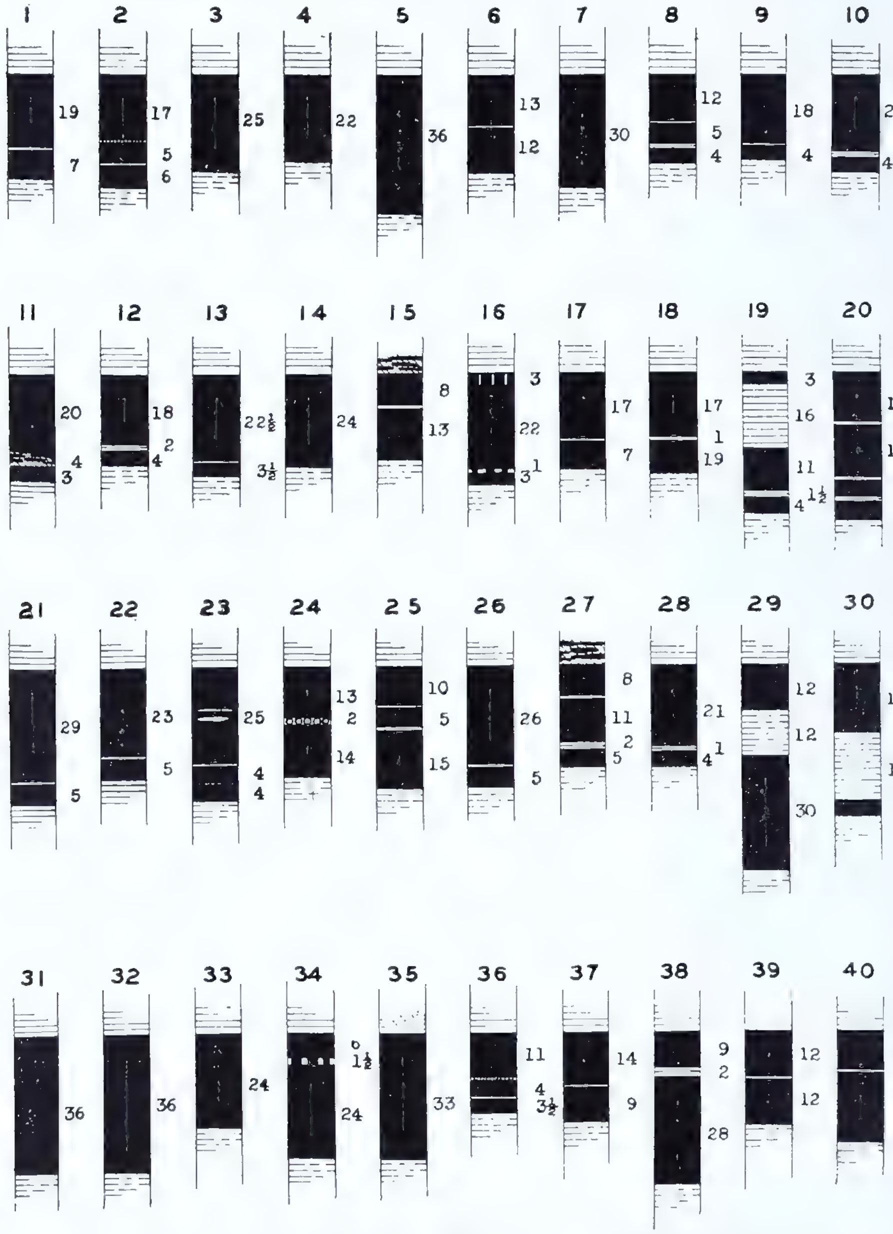


Figure 115. Sections of Darlington (Middle Kittanning) coal in Lawrence County.

1. Country bank, ¾ mile northwest of Hazeldell, Wayne township.
2. Chewton Coal Co. mine on east side of Beaver River, 1¼ miles southeast of Chewton, Wayne township.
3. Outcrop 1 mile east-southeast of Chewton, Wayne township.
4. Outcrop 1½ miles east of Chewton, Wayne township.
5. Outcrop west of Duck Run, 1 mile northeast of Hazeldell, Wayne township.
6. Outcrop east of Duck Run, 2 miles northeast of Hazeldell, Wayne township.
7. Outcrop between branches of Duck Run, 2½ miles northeast of Hazeldell, Wayne township.
8. Outcrop between branches of Duckrun town, Shenango township.
9. County mine, 2 miles southeast of Union Valley, on Snake Run, Shenango township.
10. Outcrop on West Branch of Snake Run, 1¼ miles northeast of Irish Ripple, Shenango township.
11. Outcrop 1 mile east of Newport, Shenango township.
12. Outcrop 1 mile south of Union Valley, Shenango township.
13. Outcrop ¾ mile southeast of Union Valley, Shenango township.
14. Outcrop on Snake Run 1½ miles southeast of Union Valley, Shenango township.
15. Outcrop 1 mile northeast of Energy, Slippery Rock township.

16. Outcrop on McKee Run, 1 mile north of Union Valley, Shenango township.
17. Outcrop 1 mile southeast of Altman, Slippery Rock township.
18. Outcrop in county road 1½ miles east of Altman, Slippery Rock township.
19. Outcrop in Possum Hollow, Big Beaver township.
20. Outcrop in Possum Hollow, Big Beaver township.
21. Outcrop 1 mile north of Possum Hollow, Big Beaver township.
22. Outcrop west of Beaver River, 1¼ miles south of Chewton, Big Beaver township.
23. Mine on Wampum Run ½ mile southeast of Coverdale, Big Beaver township.
24. Country bank, 1½ miles southwest of Coverdale, Big Beaver township.
25. Country bank, 3 miles northeast of Enon Valley, Big Beaver township.
26. Wampum Cement Co. mine, 1 mile southwest of Chewton, Big Beaver township.
27. Outcrop at Coverdale, Big Beaver township.
28. Country bank, 1½ miles west of Wampum, Big Beaver township.
29. Outcrop 1 mile east of Enon Valley, Little Beaver township.
30. Country bank at Enon Valley, Little Beaver township.
31. Outcrop on Little Beaver Creek, 1½ miles northwest of Enon Valley, Little Beaver township.
32. Outcrop on Honey Creek, 2¼ miles northwest of Enon Valley, Little Beaver township.
33. Outcrop on Beaverdam Run, ¾ mile southeast of Mountair, Little Beaver township.
34. Prospect 1½ miles northwest of Mountair, North Beaver township.
35. Outcrop on North Branch of Honey Creek, 2½ miles northwest of Mountair, North Beaver township.
36. Outcrop on North Branch of Honey Creek, 3½ miles north of Mount Jackson, North Beaver township.
37. Outcrop 2 miles southwest of Mount Jackson, North Beaver township.
38. Outcrop 1½ miles west of Mount Jackson, North Beaver township.
39. Outcrop 1½ miles west of Moravia, North Beaver township.
40. Outcrop 1½ miles west of West Pittsburgh, North Beaver township.

LOWER FREEPORT (D) COAL.

The Lower Freeport coal, lying about 70 feet above the Darlington coal, is persistent in the county, but is very lenticular and variable in quality. The coal is less than 2 feet thick, and is very dirty and high in sulphur. Locally, as in Perry township, the bed is over 5 feet thick, but is very dirty. In Little Beaver township it has a local thickness of 6 feet and is excellent.

UPPER FREEPORT (E) COAL.

The Upper Freeport coal lies from 130 to 140 feet above the Darlington coal. The principal outcrops are in Perry and Big Beaver townships, where it reaches a local maximum thickness of 6 feet. The average thickness is less than 2 feet. The coal is dirty, high in sulphur and ash, friable, and breaks up when mined. It is used only for domestic fuel.

BRUSH CREEK COAL.

The Brush Creek coal, lying from 200 to 220 feet above the Darlington coal, is geologically the highest coal in the county. Its outcrop is limited and only small isolated areas in Perry and Wayne townships are thick enough for profitable mining. Three feet is the maximum thickness. The coal is of the block variety, with low ash and sulphur.

CHAPTER XIX.

LYCOMING COUNTY

INTRODUCTION.

The coal-bearing groups of Lycoming County are confined to the Little Pine Creek basin in Pine and McHenry townships, and the McIntyre and McNett townships. These basins are small canoe-shaped depressions, which are evidently parts of a syncline crossing the county in a general northeast-southwest direction. The Little Pine Creek basin is eleven miles long and two miles wide, and the McIntyre-Ralston basin fifteen miles long and three miles wide. Only the highest points in these basins contain coal beds.

COALS.

The coal beds of Lycoming County have not been definitely correlated with the main bituminous coal field, but it is probable that the existing correlations are accurate. The Pottsville series contains no coal beds of commercial value, and the Lower Kittanning bed in the Allegheny group is the only one that is mined for shipping coal.

BROOKVILLE (OR CLARION ?) COAL.

The Brookville bed lies a few feet above the Johnson Run (Homewood ?) sandstone. It is a thick bed composed of alternating thin layers of coal and shale and has no commercial value.

LOWER KITTANNING (B) COAL.

The Lower Kittanning coal is the most important bed in Lycoming County. It is locally known as the Big Bed, and has been mined at many places. In the Little Pine Creek basin it ranges from 3 to 7 feet thick, and is generally divided into three benches by shale partings ranging from 3 to 18 inches thick. In the McIntyre-Ralston basin the bed ranges from 2 to 3 feet thick, including a 4 or 5 inch parting near the bottom. The coal is a semi-bituminous steam coal of fair quality, low in sulphur but high in ash. The coal is soft and friable, dull black in color, and uneven in fracture.

MIDDLE KITTANNING (C) COAL.

The Middle Kittanning coal, lying about 20 feet above the Lower Kittanning, ranges from 12 inches to 7 feet thick, and is very dirty. Where thickest it has many thick shale partings. It is not mined at present.

UPPER KITTANNING (C′) COAL.

The Upper Kittanning coal, lying about 50 feet below the Lower Freeport, is thick but composed of thin bands of good coal in several feet of bituminous shale. It has never been opened.

LOWER FREEPORT (D) COAL.

The Lower Freeport coal, lying from 80 to 90 feet below the Upper Freeport, ranges from 5 to 11 feet thick, but is entirely worthless because of many thick shale partings.

UPPER FREEPORT (E) COAL.

The Upper Freeport coal, at the top of the Allegheny group, is important in the McIntyre-Ralston basin, where it ranges from 2 to 7 feet thick. It is generally divided by one or more thick shale partings, into two or three benches, the actual merchantable coal averaging less than 3 feet thick. In one small area, the bed is nearly 7 feet thick, and is very clean. The Upper Freeport coal averages 7 per cent ash, 17 per cent volatile matter, less than 1 per cent sulphur, and ranges from 71 to 78 per cent fixed carbon. It is an excellent steam coal.

CHAPTER XX.

MERCER COUNTY

INTRODUCTION.

Mercer County is the only county in Pennsylvania that has mined and shipped Pottsville coals on a large commercial scale. These coals are thicker here than elsewhere, and were among the first coals mined in the State.

Mercer County has many railroads. The Bessemer and Lake Erie Railroad enters the county at Grove City, and runs north through Mercer and Greenville to the northern county line. The Pennsylvania Railroad follows the valley of Shenango River from the southern border of the county through Farrell and Sharon, then north to Shenango and Jamestown. The Erie Railroad follows the same route to Shenango, thence north to Greenville and Kennard. A branch of the Pennsylvania Railroad which enters the county at Leesburg, runs north to Mercer and Stoneboro, where it connects with the New York Central Railroad. The latter road enters the county east of Stoneboro and runs northwest to Jamestown and thence to Lake Erie. The Sharpsville Railroad has a few miles of track in the southwestern part of the county. The coal production of the county has many outlets by these railroads to Pittsburgh and to the Lakes.

The number of improved roads in Mercer County is growing each year. The dirt roads are good in the summer and fall, but in winter some of them are nearly impassable. These roads are used to a great extent by the farmers for hauling domestic fuel.

The surface of the county is a peneplain spotted with numerous small rounded hills. There are no deeply cut valleys. Many of the main valleys are straight, with gently sloping sides, lacking cliffs or massive outcropping rocks. The surface is covered with many feet of glacial drift which hides the bed rock. Swamps occupy many depressions in the irregular surface left by the glaciers. The rocks are almost horizontal, but locally dip 15 degrees to the southwest.

STRATIGRAPHY.

The upper groups of Pennsylvanian age have been eroded; only the lower part of the Allegheny group remains in a few isolated hilltops near the southern and eastern county line.

The Pottsville series, having an average thickness of 250 feet, covers a large part of the county. It is capped by a massive sandstone, averaging 50 feet thick, and the Sharon conglomerate marks the base. The Pottsville series contains valuable coal and iron beds.

The Mauch Chunk group has an extensive outcrop in the county. It is composed of green and red shales, and thin sandstones.

The Pocono and Catskill series may have limited outcrops in the county which are covered with glacial drift.

The Mississippian and Devonian rocks have been tested for oil and gas, but they are not coal bearing.

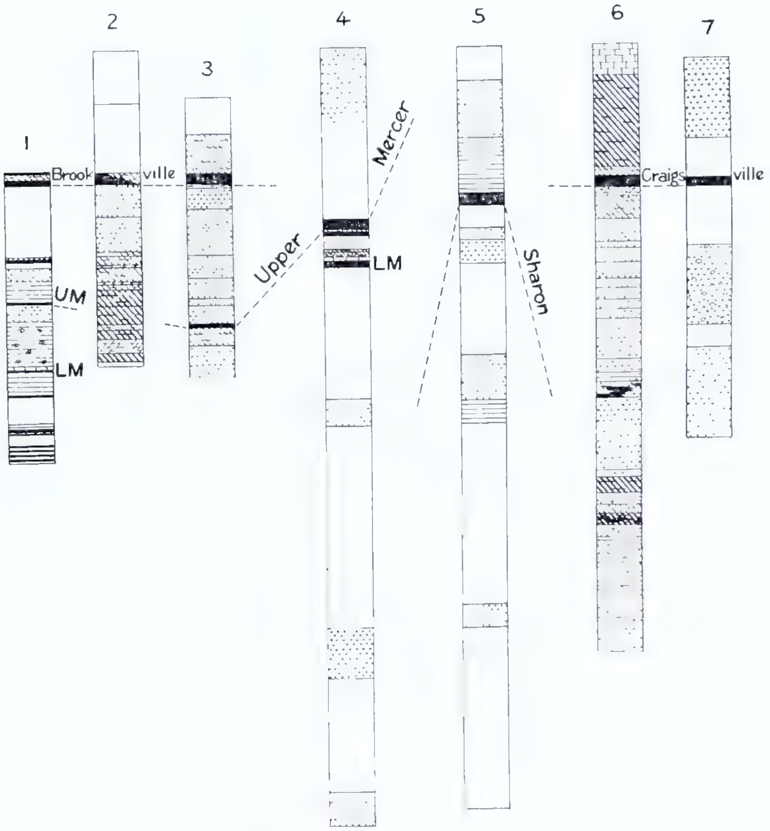


Figure 116. Stratigraphic sections, Mercer County.

1. In Devils Hollow, 2 miles west of Mercer, Lackawannock Township. Pennsylvania Second Geological Survey Rept. QQQ, p. 136, 1878.
2. One mile south of Stoneboro, Lake Township. Pennsylvania Second Geological Survey Rept. QQQ, p. 168, 1878.
3. 1½ miles southwest of Stoneboro, Lake Township. Pennsylvania Second Geological Survey Rept. QQQ, p. 172, 1878.
4. At Maple Grove and Raymilton, Sandy Lake Township. Pennsylvania Second Geological Survey Rept. QQQ, p. 182, 1878.
5. One mile west of Greenville. Pennsylvania Second Geological Survey Rept. QQQ, p. 191, 1878.
6. Water well log, 3 miles east of Leesburg, Springfield Township. B. Coleman Renick. Correlation of the Lower Allegheny-Pottsville section in Western Pennsylvania: Jour. Geol., vol. 32, No. 1, 1924.
7. One mile northeast of Leesburg, Springfield Township. B. Coleman Renick.

COALS.

There were seven workable coal beds in the county, and several other thin and unimportant ones. The Brookville (Pardoe) coal is the only important bed remaining, the others having been mined out.

SHARON COAL.

The Sharon coal is the lowest bed (geologically) that has been mined in Pennsylvania. This bed was mined and practically exhausted more than 50 years ago. At the present time, to the knowledge of the author, there is not an opening in this coal in the county. Many thousands of tons were mined from this bed in the detached areas in the western part of the county for use as steam and domestic fuel and in blast furnaces. The coal is low in sulphur, very high in moisture, and variable in ash. Locally the fixed carbon is very high, with a correspondingly low percentage of volatile matter. The coal is hard, bright, and mines out in good sized lumps. It disintegrates very fast on exposure and is not suitable for storage. Its value for raw use in the iron furnace was due to bands of mineral charcoal distributed through the bituminous matter which prevented the mass from caking.

The bed ranges from a few inches to 5 feet, and averages about 4 feet thick. The coal is generally very clean, with no distinct binders or partings. Locally the coal is so poor that it could be classed as a bituminous shale.

QUAKERTOWN COAL.

The Quakertown coal is persistent in Mercer County, but nowhere is so thick or pure as the Sharon coal. It is too thin to mine on a commercial scale, but it has been opened for domestic use in a few localities. It is generally an absolutely clean bed of bright shiny coal, low in sulphur, low in ash, high in moisture, and medium in fixed carbon and volatile matter. In Ohio, where it is mined on a large scale, it is highly prized for burning ceramic ware, and for steaming and general heating purposes.

In Mercer County, the Quakertown coal lies from 80 to 100 feet above the Sharon coal. Its horizon is marked in many places by a few inches of coal or several feet of bituminous shale. In several townships, especially East Lackawannock, it is 2 feet thick and has been mined for local use.

LOWER MERCER COAL.

The Lower Mercer is an unimportant coal, lying about 160 feet above the Sharon coal. It is used almost exclusively for domestic fuel. Its maximum thickness is 4 feet. The top half of the bed is very impure, and unminable. Locally the bed is divided into an upper and lower bench by a shale parting near the bottom of the bed ranging from a few inches to several feet thick.

A coal bed occurs in Sandy Lake township between the two Mercer coals. It has been mined, and shows two benches, a top one 4 feet thick separated by 4 feet of fire clay from a lower one 1 foot 8 inches thick. Where it has been mined at Maple Grove it is fairly clean and free from partings.

UPPER MERCER COAL.

The Upper Mercer coal, another impure bed, lies from 10 to 16 feet below the base of the Homewood sandstone. This coal is mined only in a few places. The bed is thin, nowhere exceeding 3 feet, and many bands of slate and "sulphur" make it dirty. Its average thickness is less than 12 inches.

BROOKVILLE (A-PARDOE) COAL.

The Brookville is the most important coal in Mercer County. All the large mines are working this bed and practically the entire output of the county comes from it. The coal ranges from 3 feet 6 inches to 4 feet 6 inches thick, and is free from any noticeable impurities with the exception of a local pyrite band, usually less than 1 inch thick, a few inches from the top. Locally other binders develop and a few inches of draw slate occur at the top of the bed.

The Brookville is being mined in Lake township, where it averages over 4 feet thick. It usually occurs in a single bench of clean coal with the exception of local pyrite and bone lenses. Locally two thin bone partings split the bed into three benches.

In Worth, Jackson, Findley, Springfield, and Pine townships the coal usually occurs in a single bench ranging from 3 feet to 4 feet 2 inches thick.

The Brookville is a steam and domestic coal, having a low fuel ratio, rather high moisture, ash medium, and sulphur fairly low when the partings are discarded in mining. The coal does not clinker under the boiler. It is rather friable, and breaks up in shipment.

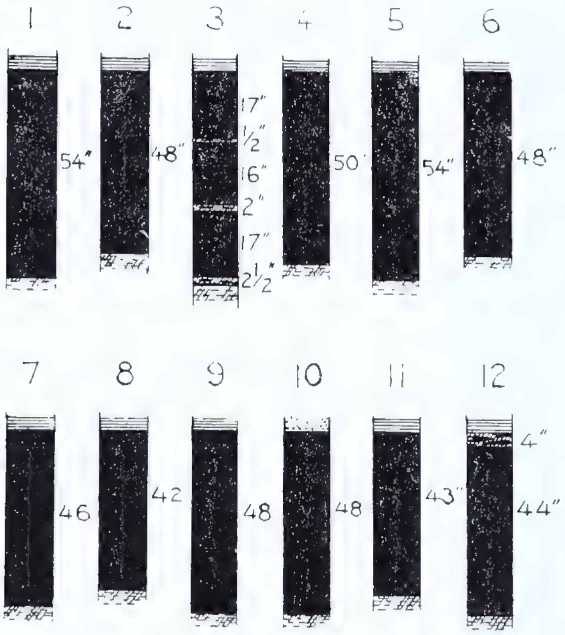


Figure 117. Sections of Brookville coal in Mercer County.

1. Mercer Iron & Coal Company. Stoneboro No. 3 mine, at Fiddlers Green 1 mile south of Stoneboro, Lake township.
2. Mercer Iron & Coal Company. Stoneboro No. 3 mine, 1½ miles northeast of Stoneboro, Lake township.
3. Section ¼ mile south of Stoneboro No. 3 mine, on L. S. & M. S. railroad, Lake township.
4. Mercer Iron & Coal Company. Beswick No. 12 mine, 2 miles southeast of Jackson Center, Jackson township.
5. James H. McCurdy & Son. McCurdy Mine, 1½ miles southeast of Jackson Center, Jackson township.
6. Filer & Jenkins. Pardoe mine, ½ mile northwest of Pardoe, Findley township.
7. Sharon Coal & Limestone Company. Buhl No. 5 mine, 2 miles east of Leesburg, Springfield township.
8. Pennsy Gas Coal Company. Pennsy mine, 1¼ miles southeast of Leesburg, Springfield township.
9. Carter Johnson. Johnson mine, 1 mile east of Grove City, Pine township.
10. Bixler Coal & Coke Company. Diamond No. 3 mine, at Enterprise, Pine township.
11. Grove City Fuel Company. Black Hill mine, 1 mile south of Enterprise, Pine township.
12. Atlas Coal Company. Atlas mine, 1 mile south of Enterprise, Pine township.

CHAPTER XXI.

SOMERSET COUNTY

INTRODUCTION.

Somerset County contains one of the largest reserves of low-volatile steam coal in the State. For many years the coal production of Somerset County was limited almost entirely to the Pittsburgh bed in the southern part, and the Lower Kittanning bed in the northern part. In the last few years the Redstone has been mined vigorously in the vicinity of Meyersdale, but its area is limited and it will soon be exhausted. In the northern part of the county the Upper Kittanning has attained much importance within the last twenty years. In the southern part of the county there are beds other than the Pittsburgh and its rider which are yet practically undeveloped, and even unprospected in large areas. These beds will furnish the bulk of future production. Prospecting and geologic work in this district have established the fact that the beds in the Allegheny and Conemaugh groups are generally thin, averaging, in most localities, less than 3 feet thick. The beds are lenticular; invariably they are subject to roof and bottom rolls and in some places to wide rock faults. In the next few years mining will be confined almost entirely to local areas where the beds are very regular and have excellent quality. With the installation of picking tables and washeries not only will the quality of the shipping coal be bettered and demand increased, but much coal can be saved by shipping one or more grades from mines.

There are fourteen coal beds of minable thickness in the county. The Lower and Upper Kittanning, Upper Freeport, and Pittsburgh Rider beds are the most important at present. The Brookville, Clarion, and Lower Freeport will be mined in the future. The production from these beds is confined almost entirely to local use.

The coal from this county is valued highly for generating steam. It is generally soft and friable but stands transportation well. It is not sized but is shipped run-of-mine. A large proportion of the shipments go east to tidewater and north to the Lakes. The Pennsylvania and Baltimore and Ohio railroads use large quantities of Somerset County coal.

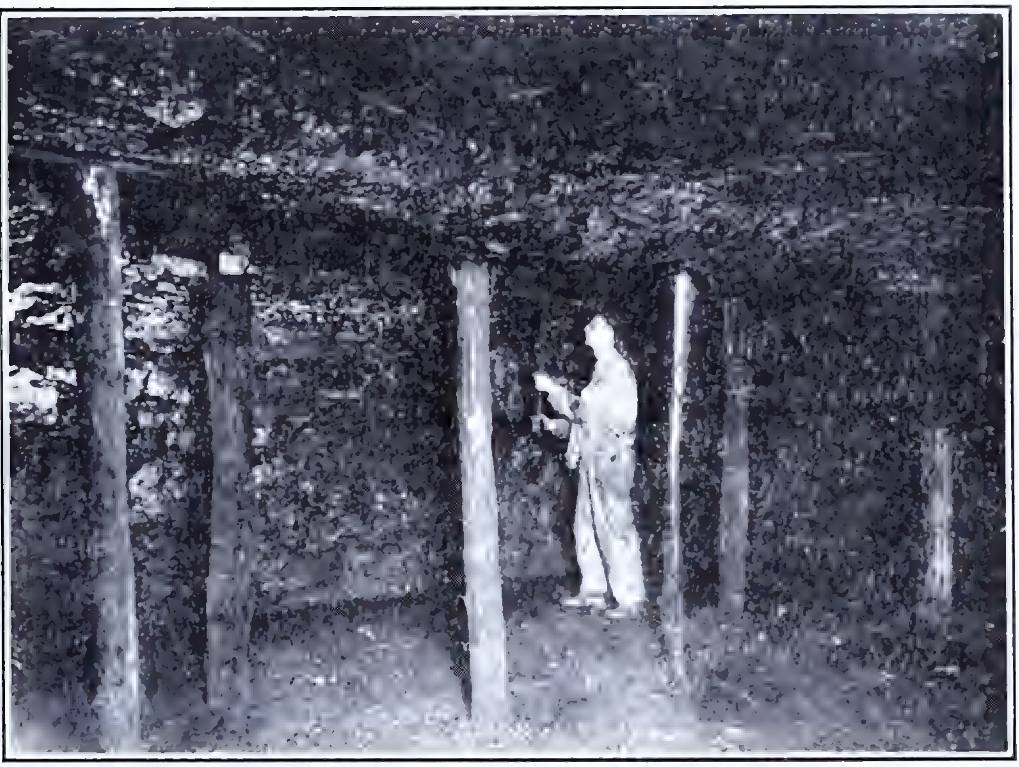
The main line of the Baltimore and Ohio railroad enters the southern part of Somerset County at Hoblitzell, runs west to Meyersdale, and follows Casselman River through the western boundary of the county. Numerous branches serve the district south of Meyersdale, Berlin, Pinehill, Somerset, and the coal mining centers in the Johnstown and Wilmore basins. The district is traversed by many improved roads most of which were recently constructed. The township roads are dirt and are kept in good condition. During times of excessive prices thousands of tons of coal are hauled over these roads to sidings.

The transportation of coal from the northern part of Somerset County depends almost entirely upon a branch line of the Baltimore and Ohio railroad running between Rockwood, Somerset, Boswell, Benson, and Johnstown. Numerous small spurs from this branch line serve the outlying coal-producing centers. The Western Maryland Railroad uses the Baltimore and Ohio tracks from Rockwood to Coal Junction. Their own spur runs from that point to Gray and Bell. A branch line of the Pennsylvania Railroad extends south from Johnstown along Stony Creek to Windber and near-by mining towns. The population of this district is grouped into numerous small mining towns situated along the railroads. These mining towns are connected by good roads, most of which are dirt. An improved road extends from the Maryland line through Meyersdale, Somerset, and Sipesville to Johnstown. These roads afford an excellent means of transporting coal to railroad sidings when the price of coal is high and small mines can afford to operate by trucking the coal.

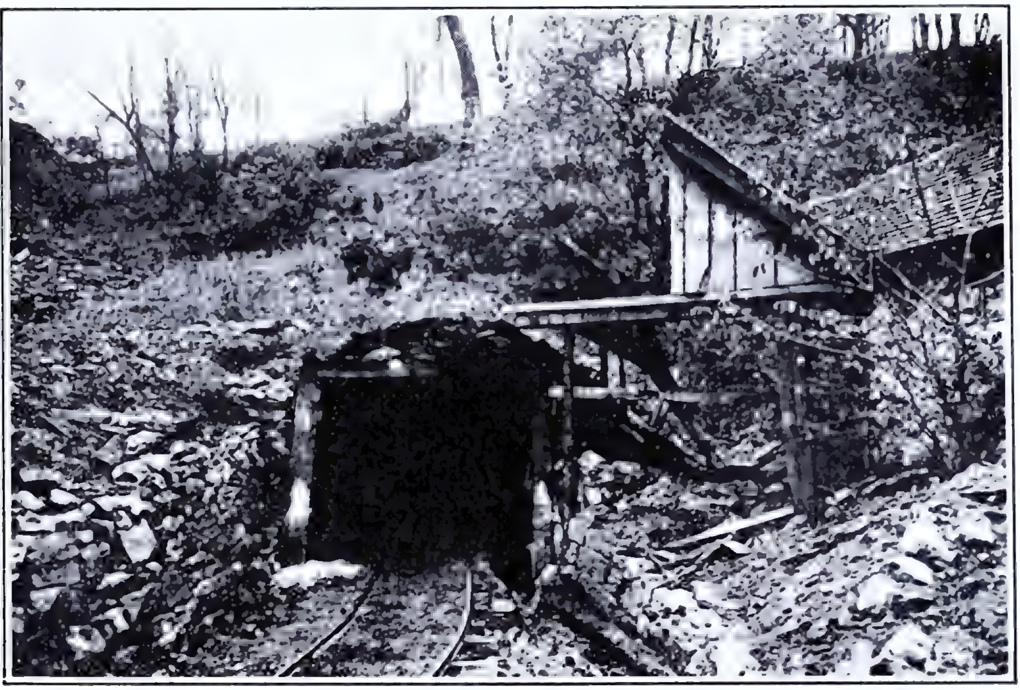
Allegheny and Negro mountains are the chief topographic features of the county. Allegheny Mountain, separating Elk Lick and Greenville townships, is a high narrow ridge with a crest averaging 2900 feet above tide. West of this mountain lies the beautiful Berlin-Salisbury basin. This basin is 9 miles wide from the crest of Allegheny Mountain to the crest of Negro Mountain. The center of the basin is decidedly hilly and cut by many streams. Allegheny Mountain has a steep and rugged slope, and Negro Mountain a gradual one. Casselman River flows in the center of the basin from Salisbury north to Meyersdale, and northwest to Garrett. A few miles west of this place it cuts the broad high ridge of Negro Mountain. The highest point so far discovered in Pennsylvania, 3220 feet, is on this mountain about 6 miles northwest of Salisbury.

The Confluence-Johnstown basin, northwest of Negro Mountain, is extremely hilly; streams have cut deep channels and flow in V-shaped valleys. Laurel Hill forming, in part, the western boundary of this district, is another distinct topographic feature. In the northern part of the county the valley between the two ridges is approximately 20 miles wide. Numerous small ridges in this valley make it rugged in some parts and rolly in others. The streams flow in rather deep valleys, particularly Stony Creek and its eastern tributary, Shade Creek.

PLATE XII.



A. Pittsburgh coal bed and draw slate in a Somerset County mine.



B. Typical country bank in Somerset County.

STRUCTURE.

Seven structural features, each having a northeast-southwest trend, have been recognized and mapped in a preliminary manner. They are, in order from east to west, Wellersburg syncline; Savage Mountain anticline; Berlin-Salisbury syncline (continuation of the Casselman syncline of Maryland; Negro Mountain anticline (continuation of Accident anticline of Maryland); Somerset syncline; Confluence-Johnstown syncline (Lower Youghiogheny syncline of Maryland); Laurel Hill anticline.

Wellersburg syncline is a deep, narrow basin east of Allegheny Mountain. Its axis extends through the town of Wellersburg northeastward and passes near Williams Station on the main line of the Baltimore and Ohio Railroad. Its total length in Somerset County is 10 miles. The deepest point in the basin is near Wellersburg where remnants of the Monongahela group cap the hilltops. The basin gradually rises northeastward and ends in Bedford County.

Savage Mountain anticline enters the county 2 miles southeast of Pocahontas, and leaves it 2 miles east of New Baltimore. The rocks dip steeply on both its flanks. The structure is regular and has no pronounced variation of dip in its total length of about 18 miles in Somerset County. The axis of this anticline forms the crest of Allegheny Mountain.

Berlin-Salisbury basin, lying northwest of Allegheny Mountain anticline, enters the district on the State line 2 miles south of Salisbury. Its axis extends in a northeastern direction just west of Salisbury, Meyersdale, Pinehill, and Berlin. It is a typical canoe-syncline, the rocks rising rapidly to the crest of Allegheny Mountain on its eastern flank. The rise is more gradual and uniform on its western slope. The deepest part of the basin is just south of Meyersdale. From this point the axis rises gradually northeast to Berlin, and southwest, slowly at first, but increasing rapidly until the Pittsburgh bed is lifted out of the hills near the Maryland State line. The axis of the basin is slightly tilted and, as a result, the trough deepens southwestward in the direction of the tilt. Berlin syncline in the northern part of Somerset County is approximately 1 mile south of Shanksville and extends in a general northeast direction near Buckstown and Cairnbrook. This syncline forms a broad basin, having its deepest point at the southern edge of the district. The dips on both flanks are small, the greatest being on the eastern flank and in the immediate vicinity of Boone. North of the Lincoln Highway and Buckstown the syncline flattens out gradually, and extends northeastward in the vicinity of Arrow as a monocline.

Negro Mountain anticline enters Somerset County about 2 miles east of Oakton, extends along Shoemaker Run, Glade Mountain, Lick

Run, Blackfield, and leaves the district about 3 miles southwest of Shanksville. This anticline is broad, rising rapidly and highest in Addison and Elk Lick townships where the lowest member of the Pocono series is exposed. The axis gradually dips northeastward and the anticline flattens out in Black and Brothers Valley townships. Negro Mountain anticline lies northwest of Berlin syncline. It is less pronounced and much smaller here than in the southern part of the county. It enters northern Somerset County 5 miles east of Somerset on the Bedford road, extends northeast, and passes near Lambertsville and Forward. Approximately 1½ miles northeast of Forward, and 2 miles northwest of Cairnbrook, the anticline flattens out and merges with the extension of the Berlin syncline. The dips on both flanks of Negro Mountain anticline are gradual. The crest is wide and the axis locally varies much in direction. The highest structural elevation is 1½ miles south of Forward in the immediate vicinity of Ridge School.

Somerset syncline lies northwest of Negro Mountain anticline, enters this district 3 or 4 miles southwest of the town of Somerset, and extends in a northeast direction west of Stony Creek. This structure is very irregular, forming a broad basin in the vicinity of Lavansville where it has merged with the Johnstown syncline. Northeast of Somerset the basin is narrower and the dips on the flanks increase. North of Stoyestown the dips decrease until the structure loses its identity north of Hooversville, and continues as a part of a broad monocline.

Boswell anticline is a pronounced local structure in the vicinity of Sipesville, Ralphton, Jenner, Boswell, and Jerome. The highest structural point on this anticline is approximately 1 mile west of Ralphton and Stoughton. The axis of this structure is very regular, extending from a point about 1 mile east of Harrison to the immediate vicinity of Boswell. The dips on both flanks are regular, the greatest being on the northwest.

The Confluence-Johnstown basin, lying northwest of Negro Mountain anticline, is broad and comparatively flat, being approximately 15 miles wide from the crest of Negro Mountain anticline to the crest of Laurel Hill anticline. The Conemaugh and Allegheny groups are exposed in almost its entire area. The axis enters the county near Confluence, extends northeast and leaves the southern district near Lavansville, a few miles west of Somerset. This basin contains a minor anticline and syncline on its eastern flank near Rockwood and Casselman which were formerly supposed to be a continuation of the Wilmore basin in northern Somerset County. The rocks rise slowly and evenly on the western flank. Johnstown syncline is the deepest structural basin in northern Somerset County. About

1 mile south of Lavansville it is merged with the Somerset syncline, but splits from it in the vicinity of Zimmerman and extends in a northeast direction near Edie, Jennertown, Glessner, and Forwardstown. The deepest point in this basin is in the immediate vicinity of Glessner. The only remaining area of Pittsburgh coal in this part of Somerset County is in the hilltops in this deep part of the basin. The southern end of the syncline is broad and the dips very low. The dips increase northeastward and the syncline narrows. Northwest of Glessner the rocks rise about 700 feet to the mile.

Laurel Hill anticline, on the western edge of the county, is a great fold that has brought the Pottsville and Mauch Chunk rocks to outcrop. Its axis is highest on the county line southeast of Wilpen; from that point it dips gradually north and south. Laurel Hill anticline is the most pronounced structural feature in northern Somerset County. Its axis follows the top of Laurel Hill, which is the boundary line between Westmoreland and Somerset counties. The Pottsville, Mauch Chunk, and Pocono series are brought to outcrop. The axis is highest on the county line southeast of Wilpen. From that point it dips gradually north and south. The dips on both flanks are rather steep, particularly north of the Lincoln Highway which runs between Jennertown and Laughlintown.

STRATIGRAPHY.

The rocks outcropping in this district belong to the Quaternary, Carboniferous, and Devonian systems. The Quaternary system is represented by sand, clay, and gravel which streams have deposited along their valleys in time of high water. These deposits are most extensive in the valley of Stony Creek. The Carboniferous system is represented by the Monongahela, Conemaugh, and Allegheny groups and the Pottsville, Mauch Chunk, and Pocono series. The Devonian is represented by the Catskill and Chemung series.

The Monongahela group is confined entirely to the hilltops in the Berlin-Salisbury and Wellersburg basins. It contains two workable coal beds, the Pittsburgh and Pittsburgh Rider. It also occurs as a few feet of cover over the Pittsburgh coal in a few high hilltops in the Johnstown basin in the vicinity of Glessner. The group is extremely shaly, but also contains two sandstones and three or more limestones averaging approximately 4 feet thick.

The Conemaugh group outcrops along the flanks of the anticlines in the Berlin-Salisbury basin, and along Casselman River and its tributaries west of Rockwood. It also outcrops in the Somerset and Johnstown synclines. Although it is coal-bearing none of the beds are worked commercially at the present time, but are large reserves for future use. This group is composed chiefly of red and olive-green shales with interbedded limestones and coal beds. In the entire thickness of 875 feet there are but few massive sandstones. The Allegheny group underlies practically the entire district. It outcrops on the flanks of the anticlines on both sides of the Berlin-Salisbury basin and along stream valleys west of Rockwood. It also outcrops in Boswell anticline and on the monocline in the northeastern part of the district, and on the western flank of the Johnstown basin. It is the chief coal-bearing group in the county, containing the thick and valuable Freeport and Kittanning groups of coal beds. This group is composed chiefly of olive-green shales, massive sandstones, and limestones beneath the coals. Its average thickness is 250 feet.

The Pottsville series outcrops on the west slope of Allegheny Mountain, on Stony Creek north of Foustwell and south of Mostoller along the entire valley of Shade Creek, and along Quemahoning Creek east of Boswell. It also forms a large area of surface rocks on the crest of Negro Mountain. It again outcrops on Laurel Hill in the western part of the county. Although this is a coal-bearing series, none of the beds are being mined at present. The Pottsville series is composed of two or more massive sandstones which are locally conglomeritic. Between these sandstones are intervals of shale which sometimes contain two or more impure coal beds.

The Mauch Chunk series is composed entirely of red and olive-green shale, and thin layers of interbedded red sandstone. An important deposit of limestone locally known as the Loyalhanna, is presumed to be a continuation of the Greenbrier limestone of West Virginia. This limestone is an important source of lime for farms in this district. The Mauch Chunk series is not coal bearing.

The Pocono, Catskill, and Chemung series, outcropping on Allegheny and Negro mountains and Laurel Hill, are composed principally of shales and a few massive sandstones which form the crest of these ridges. These series are not coal bearing.

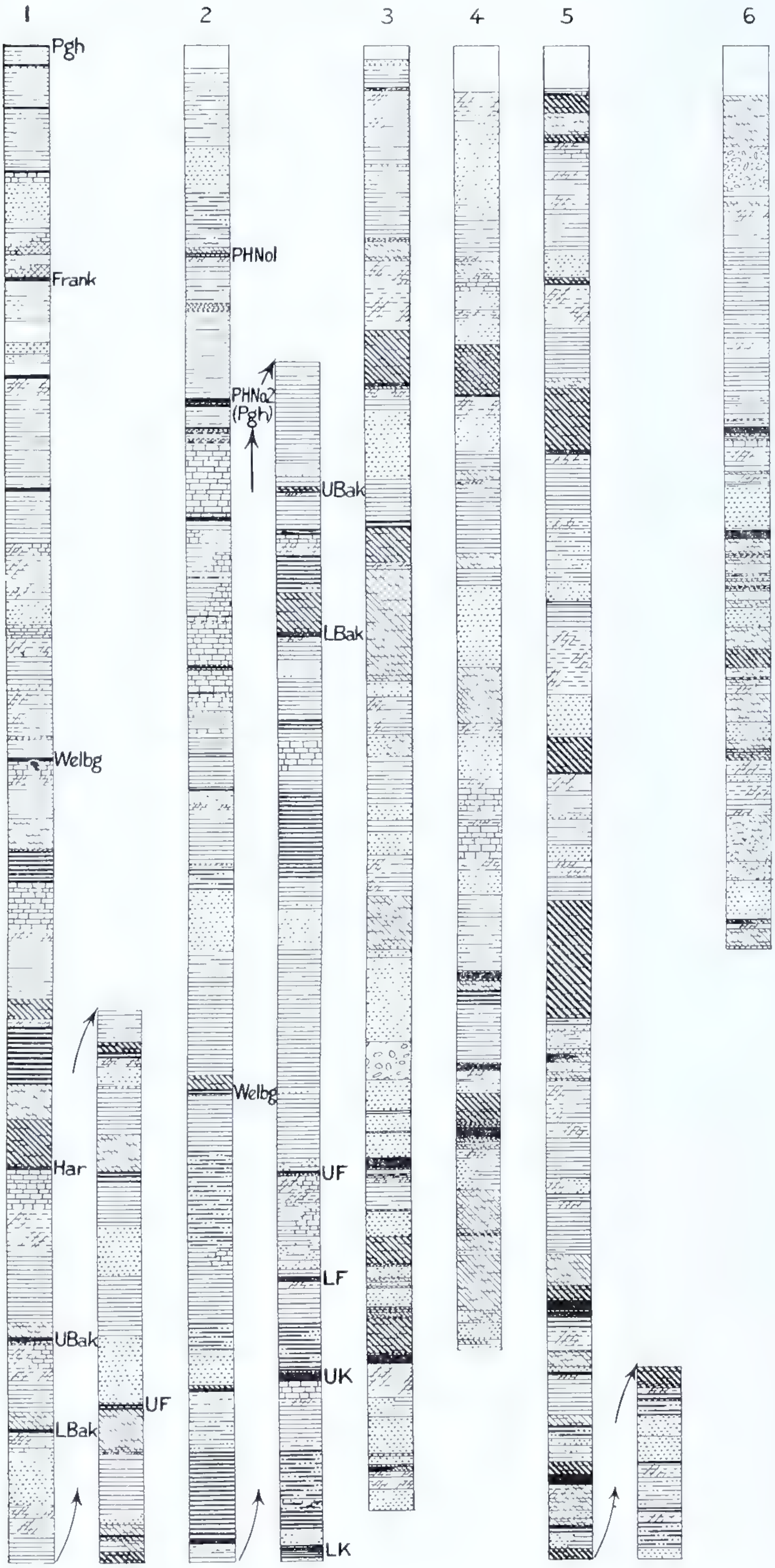


Figure 118. Somerset County. Drill hole records.

1. Consolidation Coal Co. Diamond drill hole at Shaw mines.
2. Consolidation Coal Co. Diamond drill hole at Pine Hill.
3. Niverton Coal Co. Diamond drill hole (Carver), 1/7 mile southwest of Roxbury, Brothers Valley township.
4. Niverton Coal Co. Diamond drill hole (Landis), 1½ miles south of Berlin, Brothers Valley township.
5. Niverton Coal Co. Diamond drill hole (Hay), 1 mile north of Buffalo Station, Brothers Valley township.
6. Niverton Coal Co. Diamond drill hole (Musser), 1½ miles north of Berlin, Brothers Valley township.

COALS.

Generalized section of coal beds in Somerset County.

Group	Bed	Average Interval	Average Thickness	
			Ft.	in.
Monongahela	Redstone		4	0
		25		
	Pittsburgh (Big Vein)		5	0
		160		
Conemaugh 875	Lonaconing		4	0 (very dirty)
		155		
	Wellersburg		1	0
		60		
	Barton		1	6
		210		
	U Bakerstown		2	0 (very dirty)
		40		
	L Bakerstown		1	6
		240		
Allegheny 250	U Freeport (E)		3	0
		30		
	L Freeport (D)		2	0
		25		
	U Kittanning (C′)		3	0
		60		
	M Kittanning (C)		1	0 (very dirty)
		30		
	L Kittanning (B)		2	4
		30		
	Clarion (A′)		2	8
		15		
	Brookville (A)		5	0 (very dirty)
		10		
Pottsville 250	No workable coal			

BROOKVILLE (A) COAL.

The Brookville, lying at the base of the Allegheny group, and 40 to 65 feet below the Lower Kittanning, is very persistent. The entire bed averages approximately 5 feet thick, but at most localities is too dirty to be mined commercially at the present time. It is divided into numerous benches by shale partings. The coal in these benches is also separated by many thin lenses of bone and pyrite, making the coal extremely high in ash and sulphur.

The Brookville coal outcrops near the summit of Allegheny and Negro mountains in Elk Lick township. This bed has been prospected at numerous places and has been found to be extremely dirty and of no commercial value.

The Brookville coal has not been prospected to any great extent in Brothers Valley township. It outcrops well up on the slopes of Allegheny and Negro mountains in a practically uninhabited district. During field work in this township in the summer of 1922 the writer observed this bed in many outcrops but is inclined to think that its commercial value is extremely uncertain. Locally it is thin, having fairly good quality, but within a few yards it thickens up and partings come in that entirely destroy the value of the coal.

The Brookville coal outcrops near the top of Negro Mountain anticline in Black township. The bed lies almost directly upon the Pottsville conglomerate, and is irregular in thickness and variable in quality. Very few openings have been made in this bed because of its inferior quality due chiefly to thick shale partings. Locally in the vicinity of Wilson Creek the bed is 7 feet thick, of which only 3 feet 6 inches is merchantable coal, high in sulphur and ash.

Although this bed is very persistent and distinct in Stony Creek township, very little prospecting and no mining has been attempted, chiefly because the outcrops indicate that the bed is too impure to be mined commercially at the present time, and because a large part of this township has no transportation facilities for commercial shipments. This bed probably averages over 3 feet 6 inches thick, including impurities. The physical character varies much locally. This coal may be of value when the beds of better quality have been exhausted.

This bed is not being mined at present on a commercial scale in Somerset township. The Brookville may be of minable thickness at some localities, but outcrops indicate that it is extremely impure. The coal is high in sulphur and ash because of the presence of many shale and pyrite lenses.

The Brookville coal outcrops on the western slope of Laurel Hill, and far distant from any railroad. It varies much in physical and chemical character, but is of minable thickness and quality at many localities. Drill hole records indicate that the Brookville will be of some future importance.

The Brookville coal is thick in Quemahoning township, but extremely impure. It averages about 4 feet thick, ranging from 3 to 7 feet thick. It is high in ash and sulphur everywhere because of the presence of numerous shale and bone partings and pyrite nodules. These partings have a maximum thickness of 2 feet, dividing the bed into two main benches. These are subdivided into smaller benches by thin partings. This coal is of minable thickness and quality at a few localities on Quemahoning and Stony creeks, but it will not be able to compete on the market with the Kittanning and Freeport groups of coals unless washing devices and picking tables are installed.

The Brookville is not being mined for commercial coal at present in Jenner township. It has been prospected for farm use at several localities, but its quality and thickness are so variable that it will be of value in the future only when the Kittanning and Freeport groups of coals have been exhausted. The Brookville ranges from 2 to 8 feet thick, including impurities. It is always divided into two or more benches by shale partings ranging from a few inches to 3 feet thick. The coal contains much pyrite.

The Brookville coal outcrops on Shade Creek as far south as Foustwell in Conemaugh township. It has not been mined commercially, but where prospected it averages about 4 feet thick, including numerous partings of bone and shale. Two benches, each ranging from 15 inches to 2 feet thick, occur locally and may have future commercial value. The coal is high in ash and sulphur.

In Paint township the Brookville coal outcrops on Shade Creek and its eastern tributaries, and along the western slope of Allegheny Mountain in the vicinity of Hagevo, Arrow, and Ashtola, and in the valley of Babcock Run. This bed is usually thick, but extremely impure. It has been mined at several localities for local use, but at present only one mine is working it for commercial shipment. The Brookville averages about 5 feet thick, ranging from 3 to 7 feet. The roof is black shale, and the bottom, fire clay. The bed is divided into three or four benches by two or three bone partings ranging from 2 to 6 inches thick. The top bench, usually about 6 inches thick, is inferior coal but is shipped. The middle bench is separated from the top bench by 2 inches of hard black shale. The middle bench is usually about 1 foot 7 inches thick, and contains sulphur streaks and nodules. The lower bench, ranging from 2 feet 6 inches to 5 feet 6 inches thick, is separated from the middle bench by a hard black shale parting 4 to 6 inches thick. The bottom bench also contains many streaks of sulphur nodules.

The Brookville bed is thick in Shade township, averaging over 4 feet including impurities. The coal is always high in sulphur and ash, and numerous shale and bone partings make mining unprofitable in many localities. The Lower and Upper Kittanning coals are of much better quality and the Brookville will not be mined extensively until they have been exhausted. At the present time the only openings in the Brookville are prospects and small country banks.

The horizon of the Brookville is present in townships that have not been mentioned in the preceding description. This omission is due to the fact that no authentic information has been collected concerning it. Its outcrops have indicated that it is so much inferior to near-by beds that it will be several generations until it has any economic importance.

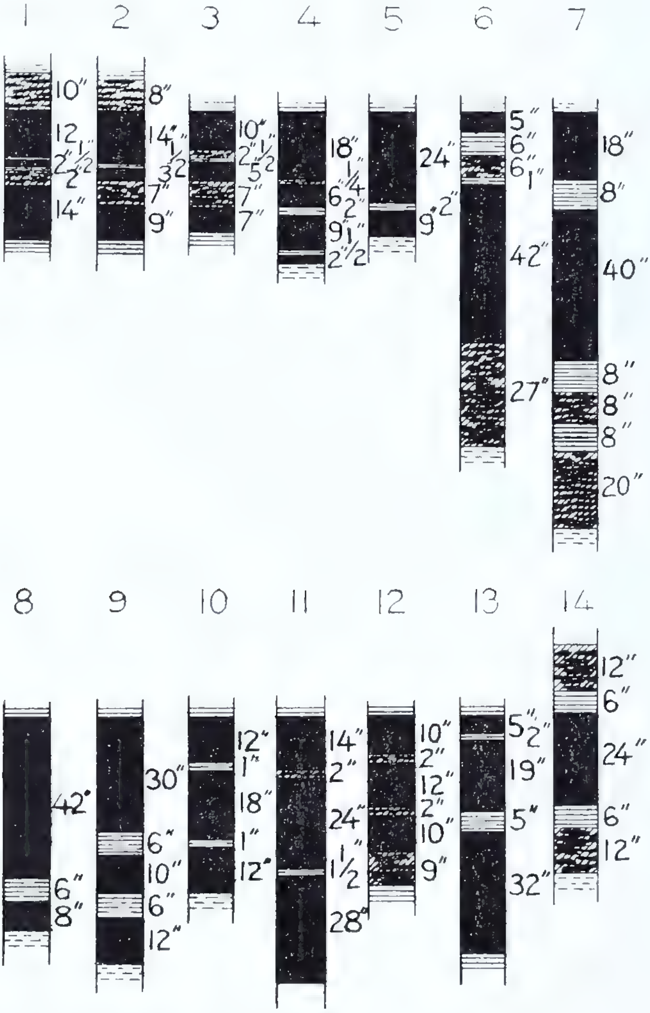


Figure 119. Sections of Clarion coal in Somerset County.

1. Outcrop on Laurel Run branch of Tub Mill Run, Elk Lick township.
2. Outcrop 2 miles northwest of Mountain View school, Elk Lick township.
3. Outcrop on Allegheny Mountain 2 miles east of Lichty school, Elk Lick township.
4. Outcrop on Flaugherty Creek 2½ miles east of Meyersdale, Summit township.
5. Louis M. Weld. Weld Nos. 1 and 2 mines, on B. & O. Railroad between Williams and Fairhope, Fairhope township.
6. Enterprise Coal Company. Ponfeigh No. 2 mine, at Blackfield, Black township.
7. Atlantic Fuel Company. Atlantic No. 2 mine, at Blackfield, Black township.
8. Consolidation Coal Company. Mine No. 114, at Wilson Creek mines, Black township.
9. Consolidation Coal Company. Mine No. 108, at Wilson Creek mines, Black township.
10. Coxes Creek Coal Company. Betsy slope, at Shamrock, Black township.

11. J. M. Murdock & Bro. Milford No. 1 mine, at Murdock, Black township.
12. Outcrop on east bank of Casselman River, ½ mile north of Markleton, Black township.
13. Phillips Coal Company. Phillips mine, 1 mile west of Scalp Level, Paint township.
14. Flora Coal Company. Flora No. 2 mine, ¾ mile north of Hooversville on east bank of Stony Creek, Shade township.

CLARION (A′) COAL.

The Clarion coal, lying approximately 15 feet above the Brookville, averages approximately 2 feet 8 inches thick throughout the entire county. Locally it is from 3 to 6 feet thick and a few commercial mines have been opened in it. Farmers have mined this bed in a few places for domestic use. The bed is characterized by many thin shale binders and many sulphur balls. Its outcrop is limited almost entirely to the flanks of Allegheny Mountain and Laurel Hill, and on Negro Mountain in the southern part of Somerset County.

South of Casselman River it has been prospected at several localities on the flanks of Allegheny and Negro mountains, but at no place was the quality good enough to warrant mining at the present time. The bed averages 2 feet 10 inches thick, of which only 18 inches is clean coal. Some unusual thicknesses of 6 feet have been noted, but in such instances the bed is much parted by shale and bone.

The Clarion coal outcrops on the crest of Negro Mountain and in the Coxes Creek valley in Black township. It is mined by drift in the vicinity of Blackfield, Wilson Creek, and Murdock. The bed averages 5 feet 6 inches thick at Blackfield, including three or four shale partings usually about 8 inches thick. A lower bench, 1 foot 8 inches thick, is too dirty to be mined profitably. The bed is very irregular because of rock rolls in the roof. The Clarion coal averages 4 feet 2 inches thick at Wilson Creek, including two or three bone and shale partings ranging from 4 to 10 inches thick. The main bench, which is good coal, averages 3 feet 6 inches. At Milford the bed averages 5 feet 6 inches thick, including two persistent shale partings ranging from 1 to 3 inches thick, and numerous knife blades of bone and sulphur. The bed is extremely variable in thickness and sandstone faults often entirely cut out the coal. Sulphur is common, occurring in the form of pyrite. The importance of this bed in normal times is slight.

West of Negro Mountain in Addison, Upper and Lower Turkeyfoot, Middlecreek, and Milford townships, the Clarion bed has been measured at many localities on its outcrop and has been correlated in drill hole records. Its commercial quality is limited to very local areas. It will be many years before this bed will produce any commercial coal because these areas are far from any railroad. The Clarion varies much in physical and chemical character within short distances and mining of this bed in this area will be extremely hazardous.

The Clarion has been recognized in the central townships of Somerset County but is rarely of commercial value. It never exceeds 6 feet thick.

In the northern townships of Somerset County the Clarion ranges from 1 to 5 feet thick. It is nowhere entirely clean, being separated into numerous benches by shale partings. Some areas may have minable quality.

In Shade township it averages less than 2 feet thick, but the bed is fairly clean although it is generally split into two or more benches by bone and shale partings ranging from 1 to 6 inches thick.

LOWER KITTANNING (B) COAL.

The Lower Kittanning is a very important bed in Somerset County. It is thickest and best in Conemaugh, Paint, Shade, and Quemahoning townships, where it is mined extensively. It ranges from 2 feet 8 inches to 5 feet thick in this area, averaging approximately 3 feet 6 inches thick. It is an unexcelled steam coal and is much valued for domestic, railroad, and bunker fuel.

In the southern part of Somerset County the Lower Kittanning averages 2 feet 4 inches thick, and is fairly clean. The sulphur and ash content is higher than in northern Somerset County. The bed is mined on Buffalo and Coxes creeks, and on its eastern outcrop in the Berlin-Salisbury basin.

The Lower Kittanning coal outcrops high up on the slopes of Negro and Allegheny mountains. This bed has been prospected on the Davis Estate on the eastern slope of Negro Mountain. It averages 2 feet thick, and has good quality. The future commercial importance of this bed is uncertain.

Addison township. The Lower Kittanning coal outcrops at one or two places on Whites Creek in Addison township. At Harnedsville it is 2 feet 10 inches thick, including numerous partings of bone and sulphur. At Listonburg the bed occurs in one bench averaging 4 feet 4 inches thick, but is extremely dirty and high in sulphur, containing many thin shale partings and numerous lenses of iron pyrite.

Black township. The Lower Kittanning coal is thin in the vicinity of Casselman, averaging 2 feet 2 inches, but has very good quality. It has been successfully mined by the use of longwall scraper loaders.

The Lower Kittanning coal outcrops on the hills on the eastern bank of Coxes Creek in Black township, and is mined by drift at many places along the valley. The bed averages about 4 feet thick, including impurities. The greater part of the merchantable coal comes from a middle bench which ranges from 15 to 18 inches thick. This bench is separated from the top and bottom benches by ½ to

2-inch shale partings. An impure bottom bench ranges from 2 inches to 2 feet 4 inches thick. This bench is not mined for shipment but is taken up in rooms and headings for height. The bed is 3 feet thick at Rockwood, including a ½-inch bone parting in the middle and 6 inches of bone on the bottom. The coal throughout this district is high in sulphur due to the presence of numerous sulphur streaks and nodules.

Summit township. The Lower Kittanning coal outcrops on the western slope of Allegheny Mountain and on the eastern slope of Negro Mountain in Summit township. It has not been prospected, but outcrop measurements range from 8 inches to 2 feet 4 inches. The bed has one or more thin bone or shale partings, in addition to a ½-inch streak of sulphur on the top.

Brothers Valley township. The Lower Kittanning coal underlies practically all of Brothers Valley township, but in most localities can be mined only by shaft. Drill hole records and outcrop measurements indicate that this bed averages less than 3 feet thick. The only commercial development is at Macdonaldton where the bed averages about 6 feet thick, including one or more thin bone partings and a lower bench of impure coal ranging from 6 inches to 2 feet 9 inches thick. This lower bench usually is not mined for shipment but is taken up in rooms and headings for height.

Stony Creek township. The Lower Kittanning outcrops on Allegheny Mountain near the headwaters of Boone Creek and Coal Run, and at numerous localities along Stony Creek and its tributaries in Stony Creek township. It is not being mined on a commercial scale in this township, principally because other beds are more easily accessible to railroads. Outcrop indications are that it preserves the same physical character as in Shade township. It probably averages about 3 feet 6 inches thick, ranging from 3 feet to 5 feet 6 inches thick, including impurities. The thick bone coal is present at the top, and one or more small benches of coal occur below the main bench. The main bench is a good grade of coal, but rather high in sulphur because of the presence of pyrite.

Somerset township. This coal is not being mined commercially in Somerset township, principally because it is deep under cover in practically the entire area. The writer has reason to believe after examination of many drill hole records, that this bed will have future importance when the more easily accessible coals have been exhausted. It ranges from 2 feet 6 inches to 6 feet thick. In some localities it is clean coal; in others it is separated into two or more benches by bone and shale partings 2 to 6 inches thick. The main bench of coal is 2 to 4 feet thick. The bed generally has from 4 to 16 inches of bone coal at the top. The bottom is fire clay and shale; the roof, sandstone and shale.

Milford township. The Lower Kittanning coal is thin in Milford township, averaging 2 feet 2 inches thick. Its quality is good, the ash and sulphur content being fairly low. The bed is remarkably free from impurities and is very regular in thickness. East of Casselman, along Casselman River, the Upper Kittanning coal is a double bed separated by a hard fire clay parting ranging from 2 to 7 inches thick. The top bench is 2 feet 2 inches thick, not including 4 inches of bony coal on the roof. The lower bench is 4 feet 2 inches thick but has two thick bone partings. The lower 6 inches is canneloid.

Lincoln township. The Lower Kittanning coal is not being mined at present on a commercial scale in Lincoln township, because its outcrop is limited to a small area and transportation facilities are bad. The Lower Kittanning probably averages 3 feet 6 inches thick in this township, and is minable at almost every locality. The writer believes that it will not show the good quality and thickness which it has east of Stony Creek.

Quemahoning township. In Quemahoning township the Lower Kittanning is mined by drift at several localities on Stony and Wells creeks, where it ranges from 3 to 5 feet thick, including impurities.

In the vicinity of Coleman, Kimmelton, Mostoller, and Stoyestown the entire bed averages 14 feet and has the following section:

Section of Lower Kittanning coal.

	ft.	in.
Shale, black		
COAL, (containing thin bone partings)		10
Fire clay, soft	1	3
COAL, (containing thin bone partings)	2	0
Sandstone, soft ....5′ 0″ to	7	6
COAL, soft (containing sulphur streaks)	2	8
Shale, hard ....0′ 1″ to	0	8
COAL, good ....1′ 4″ to	1	8
Fire clay, hard		

Opposite Rowena and Hooversville the Lower Kittanning averages 3 feet 4 inches thick, ranging from 3 to 4 feet. The bed contains an average of 7 inches of bony coal at the top which must be separated from the coal after shooting. The main bench of coal is usually about 2 feet thick, and contains numerous thin partings of sulphur. A 20-inch shale parting is underlain by a lower bench of coal 2 to 10 inches thick. The bottom is fire clay; the roof, shale and hard sandstone.

North of Hooversville, and in the vicinity of Blough and Landstreet, the coal averages 3 feet 3 inches thick, ranging from 3 feet to 4 feet 2 inches. The bony coal is present only locally at the top of the bed, and the main bench below it averages 3 feet thick. The coal in this bench is very free from sulphur, but contains a small number of thin bone streaks. Under this main bench is 3 inches of bony coal that is picked when mined. This bony coal is separated from a lower bench of coal 1 to 8 inches thick, which is only locally present, by a shale parting ranging from 2 to 10 inches thick. The bottom is shale and fire clay; the roof, shale.

Jenner township. In Jenner township the Lower Kittanning is being mined commercially on the Boswell Branch of the Baltimore and Ohio Railroad in the vicinity of Randolph, Boswell, and Critchfield. It averages about 3 feet thick, ranging from 2 feet 6 inches to 3 feet 10 inches thick. It is separated into two or more benches by bone and shale partings.

In the eastern part of Jenner township and on the Boswell anticline, the Lower Kittanning coal averages 3 feet thick. In the vicinity of Randolph it averages 3 feet 2 inches thick, including 6 inches of bony coal at the top.

At Acosta, Jenners, and Boswell the coal averages about 3 feet thick, and is divided into two or more benches by shale or bone partings. The main bench ranges from 2 to 3 feet thick. Above this main bench is a thin bench ranging from 6 to 8 inches, which is usually clean coal but locally bony. It is separated from the main bench by a shale and bone parting $\frac{1}{2}$ inch to 6 inches thick. The main bench is underlain by 4 to 6 inches of bone coal and a local bottom bench of coal from 1 to 5 inches thick. The bottom is sandstone and fire clay; the roof, sandstone and shale.

The Lower Kittanning crops out on the eastern slope of Laurel Hill near the headwaters of Beaverdam and Roaring runs. It is not being worked in this locality at present, but outcrops indicate that it is of commercial value in some places, ranging from 2 to 4 feet thick. It is separated into two or more benches by bone and shale partings ranging from 1 to 5 inches thick.

Conemaugh township. The Lower Kittanning is one of the most important coal producers in Conemaugh township. It averages about 4 feet thick, including a shale and bone parting ranging from 1 to 6 inches thick, from 3 to 12 inches above the bottom. The lower bench is not worked. The top bench, containing the commercial coal, averages 3 feet thick and is clean with the exception of lenses of pyrite and bone. Locally one or more thin bone or shale partings are present in the top bench.

In the vicinity of Holsopple and Foustwell the bed averages about 4 feet thick, ranging from 2 feet 6 inches to 5 feet 7 inches. The section of the bed is as follows: Top, bony coal, 2 inches; coal, clean, 18 to 24 inches; bone coal parting, 8 to 14 inches; shale, 12 to 16 inches; coal, 8 inches; bottom, shale and fire clay.

In the northeast part of the township the Lower Kittanning coal is very regular in physical character, usually being divided into two or more benches by thick shale partings. The top or main bench is from 2 to 4 feet thick. The two lower benches usually are very dirty and are not mined. They are separated from the main bench by a blackjack parting ranging from 3 inches to a foot or more thick.

The Lower Kittanning coal is under thick cover west of Stony Creek and is not being mined because other coals are more easily accessible along the creek and close to the railroad. Diamond drill holes indicate that the Lower Kittanning ranges from 2 feet 6 inches to 3 feet 6 inches thick in areas where it is not being mined at present.

Shade township. The Lower Kittanning is the most important coal mined in Shade township, ranging from 3 feet to 7 feet 6 inches thick. It is never entirely clean, being separated into two or more benches by bone and shale partings. Locally a few inches of coal at the top is bony. The bench usually mined ranges from 2 feet 6 inches to 5 feet thick. The roof is sandstone and shale; the bottom, shale and fire clay.

In the vicinity of Cairnbrook and Reitz the Lower Kittanning coal ranges from 3 feet 3 inches to 5 feet 10 inches thick. This includes a top bony bench usually present, ranging from 6 to 14 inches thick, which must be picked out of the coal after shooting. The main bench ranges from 2 feet 8 inches to 4 feet thick. It is good coal, but contains numerous thin lenses of pyrite. This bench is the only one mined, and is separated from a lower bench by a shale parting ranging from ½ inch to 12 inches thick. Underneath this parting is a bench of good coal generally about 6 inches thick, but ranging from 2 to 16 inches. Locally a still lower bench of coal, about 3 inches thick, underlies a shale parting ranging from 2 to 8 inches thick. This bench is never mined.

In the vicinity of Central City, and on the headwaters of Dark Shade Creek the Lower Kittanning varies much in physical character. In the immediate vicinity of Central City the bed is usually about 5 feet thick, including 10 inches of impure top coal that is shipped. Underneath this top coal is 10 inches of bony coal that must be separated by the miners before the coal is loaded. The main bench is usually about 3 feet 4 inches thick, and is of good quality. Beneath the main bench is a 4-inch shale parting and a lower bench of coal about 8 inches thick which is not mined. The roof is black shale; the bottom, fire clay.

East of Cairnbrook along the western slope of Allegheny Mountain, the Lower Kittanning is usually about 4 feet 8 inches thick, including 14 inches of bony coal at the top. Beneath this bony coal is a main bench of good coal usually about 3 feet 6 inches thick. This bench contains numerous ¼-inch bone and sulphur partings near the bottom. Underneath these partings is a 7-inch bench of good coal. Locally there is an additional bench of coal beneath the latter one, which ranges from 2 to 8 inches thick. This lower bench is not mined. The bottom is fire clay, and the roof, shale.

South of Central City, and east of Buckstown the Lower Kittanning varies greatly in physical character. It ranges from 5 to 9 feet thick, including impurities. Usually 8 inches at the top of the bed is poor grade, bony coal and is not shipped. Beneath this bony coal is 2 feet 6 inches of good coal which carries some pyrite. This coal lies on 12 to 16 inches of bony coal which must be separated from it and from an underlying bench of good coal ranging from 2 feet 4 inches to 4 feet thick. This bench is separated from a bottom bench of coal, usually about 8 inches thick, by 12 inches of shale. The bottom is shale and fire clay; the roof, shale and sandstone.

In the vicinity of Kantner, Rowena, and Pokeytown the Lower Kittanning coal ranges from 4 to 8 feet thick, including impurities. The top of the bed varies greatly in physical character. In some places the coal is clean up to the roof; in other places a draw slate, ranging from a few inches to 5 feet thick, is present. Locally there is a few inches of bone coal at the top. Beneath the impurities the succession is as follows: Main bench coal, 6 inches to 3 feet 4 inches; shale parting, 4 inches to 4 feet; coal, 4 to 18 inches; shale parting 2 to 9 inches; coal, few inches to 2 feet. The bottom is fire clay; the roof, shale and sandstone. In some mines these lower benches are not taken up, and the shale parting below the main bench is used for bottom.

In the vicinity of Hooversville, and along Fallen Timber Run the Lower Kittanning coal averages 4 feet thick, ranging from 3 to 5 feet. A local top bench of coal, ranging from 1 to 6 inches thick, occurs above a shale and bone coal mixture 4 to 12 inches thick. This bone coal mixture is taken down in the headings for height, and falls when the coal is mined out beneath it. A small bench of coal above is lost when mixed with these impurities. Beneath this bone coal mixture is a bench of good coal ranging from 12 to 14 inches thick, and separated from the main bench by a bone parting 1 to 2 inches thick. The main bench of coal is usually between 3 and 4 feet thick, and is clean with the exception of pyrite nodules and sulphur streaks. Under the main bench there are locally: a thin shale parting; coal, 6 inches; shale parting, 12 inches; bottom bench coal, 8 to 12 inches. The bottom is shale and fire clay; the roof, shale and sandstone.

Paint township. The Lower Kittanning bed is the most important coal in Paint township. It furnishes the bulk of the production from the well-known Windber district. It is highly prized as a steam, domestic, railroad, and bunker fuel. Thousands of tons are shipped yearly to tidewater and to the Lakes. The coal outcrops well down the hills in the vicinity of Windber, and is mined by drift. The coal can be mined also by drift along Shade Creek and its eastern tributaries, and along the eastern slope of Allegheny Mountain.

The Lower Kittanning is very regular in physical character. The bed is usually divided into two or more benches by thick shale partings. The top bench, which is mined, ranges from 3 feet 3 inches to 5 feet thick. This main and top bench is separated from a middle bench by a band of black and yellow sulphur, and shale, locally known as blackjack. Underneath the blackjack is a bench of coal which is not persistent, ranging from 2 inches to 2 feet 6 inches thick. This coal is rarely taken up in mining. Locally a second thin bench of coal is present beneath the blackjack.

The Lower Kittanning ranges from 3 feet 3 inches to 4 feet 6 inches thick in the vicinity of Windber. The top and main bench is usually about 3 feet 6 inches thick. It is clean coal, with the exception of some sulphur and shale nodules in it. This bench is separated from a bottom bench by 6 to 12 inches of bottom shale. The lower bench of coal, ranging from 0 to 2 feet 6 inches thick, is usually present, but locally the shale parting thickens and the lower bench is cut out. The roof is sandstone and shale; the bottom, hard fire clay.

In the vicinity of Rummel the Lower Kittanning averages about 4 feet 4 inches thick, ranging from 3 to 5 feet. The main and top bench is usually about 3 feet 6 inches thick, and is separated from a middle bench 2 inches thick, by a 2-inch bony coal parting. The middle bench is separated from a lower 10-inch bench by a shale parting 8 to 10 inches thick. The roof is shale; the bottom, hard fire clay.

In the vicinity of Hagevo and Arrow the Lower Kittanning is about 4 feet thick. The top and main bench is usually about 3 feet thick, but ranges from 2 feet 6 inches to 4 feet. Locally this bench contains thick layers of black, soft sulphur, but usually it is clean coal. The top and bottom benches are separated by a shale parting usually about 12 inches thick. Locally this parting contains sulphur nodules called blackjack. The bottom bench is usually from 3 to 8 inches thick. This is mined only when the quality is good. The roof is sandstone and shale; the bottom is fire clay. Locally a bony coal, about 1 inch thick, occurs at the top of the bed.

In the vicinity of Blough and Hillsboro the Lower Kittanning is usually about 3 feet thick, ranging from 2 feet 8 inches to 3 feet 6 inches. Two inches of bony coal at the top of the bed is hard to separate from the coal. Beneath this bony coal is a bench of good coal, usually about 1 foot 8 inches thick. This rests on a parting of bone coal and sulphur usually about 12 inches thick. Underneath this blackjack parting is 14 inches of shale and an 8-inch bench of coal. This lower bench is mined when the quality is good. The bottom is shale and fire clay; the roof, shale and sandstone.

In the vicinity of Landstreet and Seanor, east of Stony Creek, the coal averages about 3 feet 4 inches thick, and has the same physical and chemical character as at Blough and Hillsboro. It is divided into two benches by a parting of shale, bone coal, and pyrite, ranging from 4 to 16 inches thick. The bottom bench ranges from 4 to 10 inches thick.

Ogle township. In the northern part of Ogle township the Lower Kittanning coal averages about 4 feet thick, and in most places is clean. Locally it is divided into two benches by a thin shale and bone parting near the top. The roof is hard shale, and the bottom, fire clay. Underneath the main bench is a local bench of coal usually about 6 inches thick, and separated from the main bench by an 8-inch shale parting.

In the southern part of the township the Lower Kittanning coal is thinner, averaging about 3 feet 2 inches thick. The top coal, usually 6 to 14 inches thick, is bony, and is picked out of the clean coal after shooting. The main bench is from 2 feet 4 inches to 2 feet 10 inches thick. The main bench is separated from a bottom bench, usually from 4 to 6 inches thick, by a shale parting 3 to 10 inches thick. The bottom, which is rolly, is fire clay and soft sandstone; the roof is shale and sandstone.

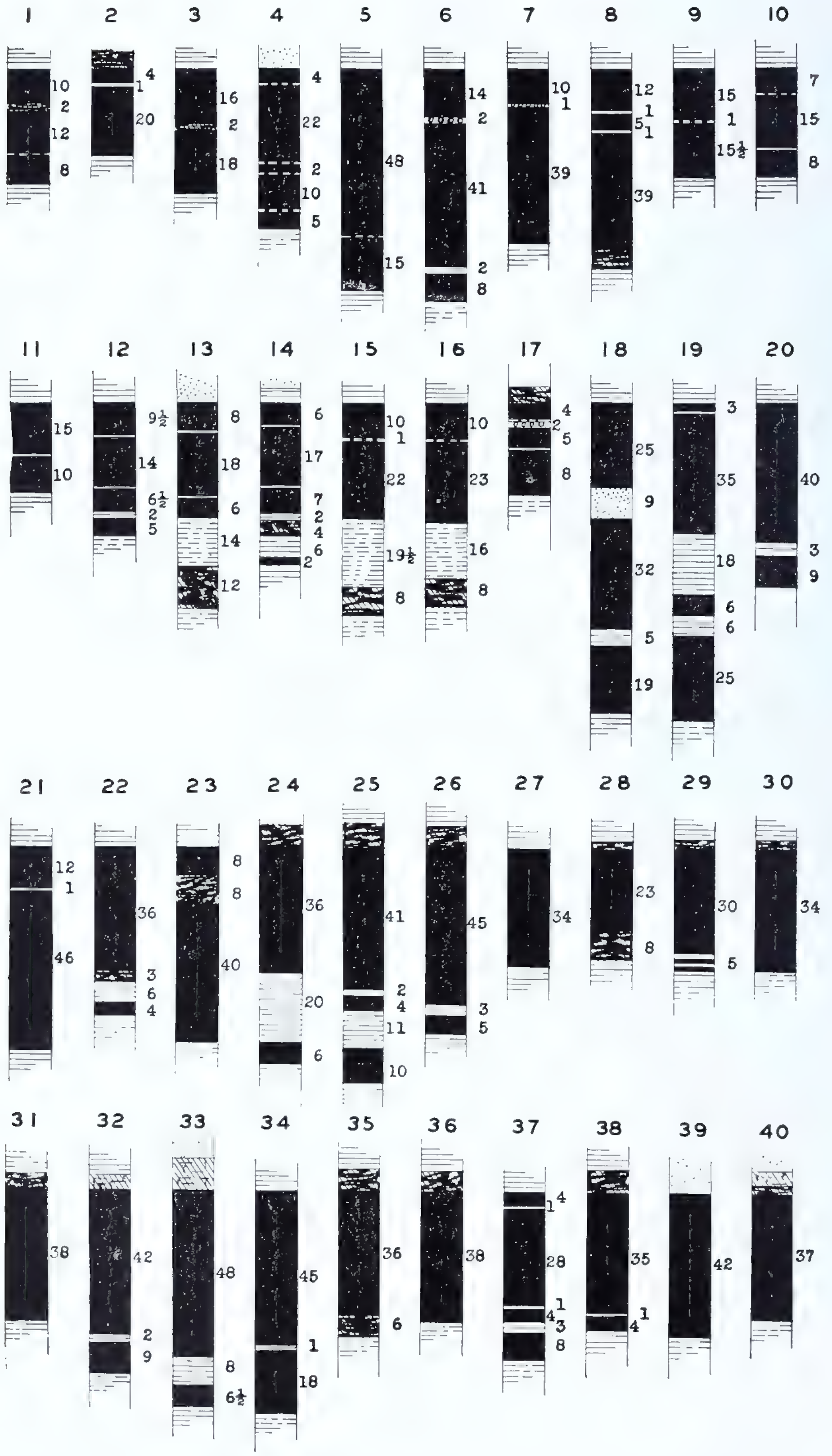


Figure 120. Sections of Lower Kittanning coal in Somerset County.

1. Outcrop on Allegheny Mountain 2 miles east of Lichty School, Elk Lick township.
2. Outcrop on Laurel Run branch of Tub Mill Creek, 4 miles west of Salisbury, Elk Lick township.
3. Outcrop on Allegheny Mountain, 2 miles east of Meyersdale, Elk Lick township.
4. Coal in drill hole record at Pine Hill.
5. Brothers Valley Coal Company. Pen Mar No. 3 mine, at Macdonaldton, Brothers Valley township.
6. Brothers Valley Coal Company. Pen Mar No. 4 mine, at Macdonaldton, Brothers Valley township.
7. Brothers Valley Coal Company. Pen Mar No. 5 mine, 1 mile southwest of Macdonaldton, Brothers Valley township.
8. Berlin Coal Company. Salco mine, 1½ miles west of Mcdonaldton, Brothers Valley township.
9. Ivy Ridge Coal Mining Company. Ivy Ridge mine, ¼ mile east of Rockwood Station, Black township.
10. Penelec Coal Corporation. Penelec No. 3 mine, on W. M. R. R. opposite B. & O. Station, Black township.
11. C. A. Miller Coal Company. Mary Helen mine, on Coxes Creek, ¾ mile north of Rockwood, Black township.
12. Hocking Coal Company. Hocking mine, 2 miles northeast of Rockwood on east slope of Coxes Creek, Black township.
13. Coxes Creek Coal Company. Mary Jeanne mine, 2½ miles northeast of Rockwood, near Shamrock, Black township.
14. MacGregor Coal Company. MacGregor No. 1 mine, ½ mile south of Bando, Black township.
15. J. M. Murdock & Bro. Milford Nos. 2 and 3 mines, at Murdock, Black township.
16. O'Dwyer-Beachley Coal Company. O'Dwyer No. 1 mine, 3 miles south of Somerset and 1 mile north of Murdock, on Coxes Creek, Black township.
17. M. A. Snyder Coal Company. Snyder mine, ½ mile east of Markleton, Black township.
18. Bowman Fuel Company. Bowman mine, at Stoyestown, Quemahoning township.
19. Quemahoning Coal Company. Quemahoning No. 9 mine, at Kantner (Stoyestown), Quemahoning township.
20. Quemahoning Coal Company. Mine No. 15, 1 mile southeast of Rowena, Shade township.
21. Wilbur Coal Mining Company. Knickerbocker No. 4 mine, ¼ mile southeast of Pokeytown, Shade township.
22. Somerset Creek Fuel Company. Somerset Creek No. 1 mine, 1¼ miles south of Hooversville on west bank of Stony Creek, Quemahoning township.
23. Wilbur Coal Mining Company. Knickerbocker No. 3 mine, ½ mile south of Hooversville, Shade township.
24. Old Colony Coal Mining Company. Old Colony No. 1 mine, ¼ mile west of Hooversville, Quemahoning township.
25. Custer Coal Company. Custer mine, ¼ mile northeast of Hooversville, Shade township.
26. Baker Whiteley Coal Company. Elma No. 2 mine, 1 mile east of Hooversville, Shade township.
27. Flora Coal Company. Flora No. 1 mine, on right slope of Stony Creek, 1 mile north of Hooversville, Shade township.
28. Wilbur Coal Mining Company. Knickerbocker No. 6 mine, near Blough Station, Paint township.
29. Wilbur Coal Mining Company. Knickerbocker No. 5 mine, 1 mile north of Blough, Quemahoning township.
30. Pennsylvania Collieries. Pretoria No. 23 mine, ½ mile southeast of Jerome Jct., Paint township.
31. Eash Coal Mining Company. Eash mine, ½ mile west of Jerome Jct., Conemaugh township.
32. Maple Ridge Coal Company. Maple Ridge No. 3 mine, at Hollsopple, Conemaugh township.
33. Lochrie-Price Coal Company. Lochrie-Price mine, at Foustwell, Paint township.
34. Grazier Coal Mining Company. Thermal No. 9 mine, ¾ mile north of Foustwell, Conemaugh township.
35. Standard Quemahoning Coal Company. Standard No. 1 mine, 1 mile northeast of Randolph, Jenner township.
36. Lohr Fuel Company. Alexander mine, ½ mile north of Randolph, Jenner township.
37. Homer Quemahoning Coal Company. Homer No. 1 mine, ¾ mile southwest of Randolph, Jenner township.
38. Steffey & Hanna. Steffey No. 3 mine, on Twomile Run, 1 mile northwest of Stoughton, Jenner township.
39. Jasahill Coal Mining Company. Knickerbocker No. 7 B mine, Conemaugh township.

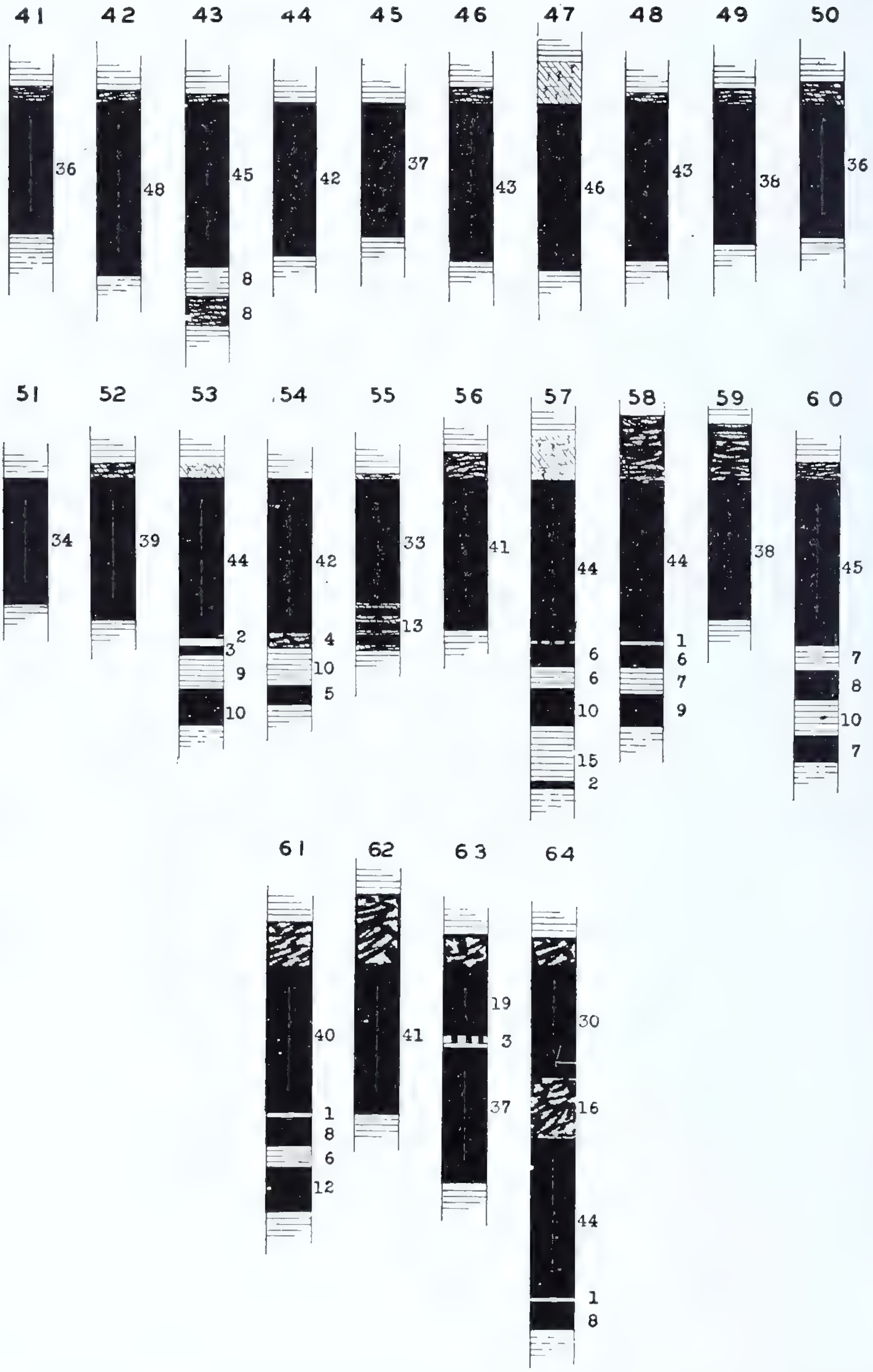


Figure 121. Sections of Lower Kittanning coal in Somerset County.

40. Cambria Fuel Company. Cambria No. 1 mine, at Border Station on B. & O. R. R., Conemaugh township.

41. Bird Coal Company. Bird No. 4 mine, 1 mile southwest of Kring Station, on Kaufmans Run, Conemaugh township.

42. Spruce Run Coal Company. Spruce Run No. 1 mine, on Spruce Run, 2 miles southwest of Windber, Paint township.

43. Lehman & Estep Coal Company. Lehman & Estep mine, ½ mile southeast of Paint Creek, Paint township.

44. Berwind-White Coal Mining Company. Eureka No. 30 mine, ½ mile west of Paint, Paint township.

45. Berwind-White Coal Mining Company. Eureka No. 31 mine, ¼ mile south of Windber, Paint township.
46. Berwind-White Coal Mining Company. Eureka No. 35 mine, in Windber Borough, Paint township.
47. R. L. Sproat. Sproat No. 3 mine, 1½ miles south of Windber, west of Weaver Run, Paint township.
48. Windber Standard Coal Company. Thermal No. 12 mine, 1 mile southeast of Windber on Seese Run, Paint township.
49. Berwind-White Coal Mining Company. Eureka No. 36 mine, 1½ miles northeast of Windber on Paint Creek, Paint township.
50. Reitz Coal Company. Reitz No. 6 mine, 4 miles northwest of Ogletown, Ogle township.
51. Heckler Faust Coal Company. Heckler Faust mine, 2 miles northeast of Rummel, Ogle township.
52. Ashtola Coal Mining Company. Allison mine, 1½ miles northeast of Rummel, Paint township.
53. Egolf Coal Mining Company. Egolf No. 3 mine, ½ mile east of Rummel, Paint township.
54. Arrow Coal Mining Company. Arrow No. 1 mine, ½ mile south of Arrow, Paint township.
55. Shade Coal Mining Corp. Hagevo mines 1 to 4, at Hagevo, Paint township.
56. Huskin Coal Mining Company. Huskin No. 1 mine, 1 mile northwest of Old Shade Furnace, 2½ miles northwest of Cairnbrook, Shade township.
57. Reitz Coal Company. Reitz No. 2 mine, ¾ mile east of Cairnbrook, Shade township.
58. Egolf Coal Mining Company. Katherine mine, 2½ miles northwest of Cairnbrook, Shade township.
59. Imperial Coal Corp. Shade Creek No. 1 mine, 2 miles northwest of Cairnbrook, Shade township.
60. Arrow Coal Mining Company. Arrow No. 5 mine, at Reitz, Shade township.
61. Loyal Hanna Coal & Coke Company. Loyal Hanna No. 6 mine, at Cairnbrook, Shade township.
62. Reitz Coal Company. Reitz No. 4 mine, at Central City, Shade township.
63. Reitz Coal Company. Reitz No. 3 mine, 1 mile south of Central City, Shade township.
64. Haskin Coal Mining Company. Haskin No. 3 mine, 3½ miles south of Central City on Coal Run, Shade township.

MIDDLE KITTANNING (C) COAL.

The Middle Kittanning coal, lying 50 feet above the Lower Kittanning, is generally extremely impure where thickest. Locally the bed is less than 18 inches thick and its quality is good. The Middle Kittanning is not being worked in Somerset County. It may have some commercial value in local areas. No detailed sections of the bed are available for publication because its minor importance did not justify measuring it in reconnaissance work.

UPPER KITTANNING (C′) COAL.

The Upper Kittanning coal, lying 75 feet below the Upper Freeport and midway between the Lower Kittanning and the Upper Freeport, is the most persistent bed and the largest producer of commercial coal in northern Somerset County. Its chief development is in the townships west of Stony Creek, principally Jenner and Conemaugh. It ranges from 2 feet 10 inches to 7 feet 6 inches thick. In the southern townships it is mined only in the localities where it is thickest, principally on Buffalo, Coxes, and Whites creeks. The bed contains numerous shale and bone binders and is locally high in ash and sulphur. When properly cleaned it makes a good grade of steam coal. This bed is much valued for steam, domestic, and railroad fuel.

The Upper Kittanning outcrops on the western slope of Allegheny Mountain and the eastern slope of Negro Mountain. The bed averages 3 feet thick and is locally 5 feet. Its physical character is not persistent in large areas. In some localities it occurs in a single bench of clean coal 2 feet 3 inches to 4 feet 6 inches thick; in others it is split into two or more benches by shale and bone partings ranging from 2 to 10 inches thick. The bed is not being mined but it undoubtedly will have future value.

Addison township. The Upper Kittanning coal is mined extensively in the vicinity of Listonburg in Addison township, where it ranges from 3 feet to 4 feet 4 inches thick. The coal is high in sulphur and ash. With the installation of picking tables and washeries, this district would be able to increase its production, ship two grades of coal, and lower the percentage of loss in mining. In this vicinity the physical character of the bed varies greatly in short distances. Where thinnest the bed usually has no characteristic impurities with the exception of small lenses of bone and iron pyrite. Where thickest it is usually divided into one or more benches by one or more thin bone partings, and locally has 4 to 14 inches of bone coal on the bottom. This bone coal is not taken up in mining.

The Upper Kittanning coal is the most important bed in the Confluence-Listonburg district where it is mined in many places by drift. Its importance has so overshadowed the other coals that they have never been prospected to any great extent. They are present, but their thickness and quality do not justify development at present, at least while large acreages of the Upper Kittanning bed remain unmined. The Upper Kittanning coal averages 3 feet 4 inches thick in the vicinity of Confluence. The top 2 feet is clean coal; the bottom 16 inches includes 1 inch of shale parting and 4 inches of bone coal at the base. At Harnedsville the upper bench, 3 feet thick, is separated from the lower bench, 10 inches thick, by an 8-inch fire clay parting. At Beachley the bed ranges from 3 feet 2 inches to 4 feet thick. It is never entirely clean, but the partings are not persistent. In one mine, where the total thickness is 3 feet 8 inches, 12 inches at the top is a mixture of alternating bands of bone and coal. The remainder of the bed is clean. At another locality the bed is 4 feet thick and is clean with the exception of a ½-inch shale parting 2 feet above the bottom.

Turkeyfoot township. The Upper Kittanning coal, the important coal in the Upper and Lower Turkeyfoot townships, ranges from 4 to 9 feet thick, including many impurities. It is characteristically a double bed separated into two benches by a fire clay or shale parting ranging from 2 to 4 feet thick. Draw slate 4 to 6 inches thick

ous benches by shale partings. The top bench of coal ranges from 5 inches to 2 feet 8 inches thick, and is separated from the bench below by a shale parting ranging from ½ inch to 2 inches thick. The middle bench of coal ranges from 6 inches to 2 feet 8 inches thick. This coal is clean except for streaks and nodules of pyrite. A lower bench, ranging from 6 to 10 inches thick, is sometimes present, but is very dirty and is not mined for shipment. The bottom is fire clay and limestone; the roof, sandstone and shale.

Somerset township. In Somerset township the Upper Kittanning bed averages about 4 feet thick, including impurities. It is mined along the Baltimore and Ohio Railroad at Somerset, Listie, and Adams. Elsewhere mining has been delayed because the outcrop is limited to that part of the township lying east of the railroad.

At Somerset the Upper Kittanning averages about 4 feet 6 inches thick, including impurities. Bony coal 2 to 4 inches thick forms the top. The main bench ranges from 2 feet 4 inches to 3 feet 8 inches thick. Under it is a fire clay parting from 2 inches to 2 feet thick. The bottom bench of coal, ranging from 8 to 14 inches, is high in ash and sulphur, but is being mined.

In the vicinity of Listie and Geiger the Lower Kittanning averages 4 feet 6 inches thick, including impurities. The top bench of coal ranges from 18 inches to 4 feet thick. This bench contains a few thin partings of bone and sulphur. Below it is a parting ranging from 1 inch to 7 feet thick, which varies much in physical character. In some localities it is soft shale mixed with coal, the bottom being hard shale; in other localities, where the parting is thickest, it is composed of shaly sandstone. The bench of coal lying beneath this parting ranges from 18 inches to 3 feet thick, and is locally dirty and not mined. Then follow 2 to 8 inches of shale, 2 to 5 inches of coal, 2 to 6 inches of shale, and 3 inches of coal.

In the vicinity of Adams and Friedens the Upper Kittanning ranges from 2 feet 6 inches to 4 feet 6 inches thick. The top bench, ranging from 18 inches to 3 feet, is good clean coal, and is separated from a bottom bench by a shale parting 1 to 3 inches thick. The bottom bench is usually about 6 inches thick, and too high in sulphur to be mined commercially. The roof is sandstone; the bottom, limestone.

Lincoln township. The Upper Kittanning is mined by slope near the northern line of Lincoln township west of Acosta, where it averages 3 feet 8 inches thick. Drill hole records in the Johnstown and Somerset basins, and outcrops along Laurel Hill indicate that this thickness is very persistent throughout the entire township. The bed is never entirely clean, being separated into two or three benches by black shale partings varying much in thickness.

Where mined north of Sipesville and west of Acosta the bed occurs in three benches, as follows: Coal, 16 inches to 2 feet; shale, ¼ inch to 3 inches; middle bench of coal, 18 inches to 2 feet 8 inches; shale, 1 to 6 inches; bottom bench of coal, 4 to 12 inches. This bottom bench contains many thin shale partings and sulphur streaks, and is not mined for shipment. The bottom is shale and limestone; the top, shale and sandstone.

Jenner township. The Upper Kittanning is one of the most important producers in Jenner township, and numerous large commercial mines are working this coal. The bed averages 4 feet thick, and ranges from 3 feet to 5 feet 6 inches thick. It outcrops on Quemahoning Creek and Twomile Run and their tributaries, and on the flanks of the Boswell anticline.

In the vicinity of Acosta the Upper Kittanning averages 3 feet 10 inches thick. It is divided into two benches by a shale binder 1 to 2 inches thick. The top bench ranges from 16 inches to 1 foot 10 inches thick, and the bottom bench is usually 2 feet 3 inches thick. The bed is overlain by black shale 3 feet thick. Locally a thin bench of coal is present underneath the lower bench and separated from it by 4 inches of shale. In some mines the coal is divided into three benches by ¼ inch partings and has about 6 inches of bone coal at the top. The top bench of coal is usually about 6 inches thick, the middle bench 2 inches, and the bottom bench ranges from 2 feet 6 inches to 3 feet thick. In the vicinity of Critchfield and Ralphton the bed averages 3 feet 8 inches thick, not including 4 inches of bony coal at the top. The main bench is separated from this bony coal by a 4-inch shale parting. The main bench ranges from 2 feet 4 inches to 3 feet 8 inches thick. The bottom is shale and limestone; the roof, shale and sandstone.

On the Western Maryland Railroad west of Coal Junction the entire bed averages 5 feet 4 inches thick and displays the following section: Shale, black; coal 4 inches; coal, bony, 3 inches; coal, 6 inches; shale 7 inches; coal, clean, 12 inches; shale and coal 3 inches; coal, clean, 1 foot 10 inches to 2 feet 4 inches; shale 2 inches; coal, bony, 4 inches; fire clay and bone coal.

The Upper Kittanning varies much in physical character in the vicinity of Jenners, where it averages 4 feet 3 inches thick. The entire bed is often 6 to 8 feet thick. In some mines the coal occurs in a single bench, with 4 inches of bone coal on top and 5 inches of shaly coal on the bottom. The clean coal averages about 4 feet thick. In other mines the bed is divided into four benches by partings and binders. The usual condition of the bed is: Draw slate 4 inches, top bench coal 9 inches, shale parting ¼ inch to 6 inches, main bench coal 4 feet, shale 2 inches, lower bench dirty coal, not mined, 4 to 6 inches. Below this is a ½-inch shale parting and a bottom bench which also is dirty and not mined.

In the vicinity of Boswell the Upper Kittanning coal averages over 6 feet thick but carries many impurities. The top bench or roof coal, 9 inches thick, is impure and not mined. Under this follow in order: Shale, 2 inches; coal, high in sulphur, 12 inches; shale, 2 to 4 inches; clean coal, 2 feet 4 inches; shale, 2 inches; clean coal, 2 feet 8 inches. The bottom is shale and limestone; the top is sandstone and shale.

Quemahoning township. The Upper Kittanning is the most important producer in Quemahoning township. It is being mined on Stony and Quemahoning creeks and their tributaries. It ranges from 2 feet 6 inches to 4 feet 6 inches thick, averaging about 3 feet 6 inches. It is a coal of excellent quality, and is highly valued for steam, domestic, and railroad fuel.

In the southeastern part of Quemahoning township in the vicinity of Stoyestown and Mostoller, the Upper Kittanning coal averages 3 to 6 inches thick, and is divided into two benches by a 2 to 3 inch shale parting. The top bench is usually about 3 feet thick, and is overlain by draw slate 1 to 3 inches thick. The bottom bench ranges from 3 to 8 inches thick, and is usually good clean coal. It is locally underlain by a bench of bony coal averaging about 4 inches thick. The bottom is fire clay; the roof, sandstone.

In the northern part of Quemahoning township the Upper Kittanning coal ranges from 2 feet 8 inches to 4 feet thick, averaging 3 feet 5 inches thick. The coal generally occurs in one bench and contains numerous streaks of sulphur. Locally the bed is divided into two benches by a ¼ to 4 inch shale parting.

In the southwestern part of Quemahoning township in the vicinity of Ralphton, the Upper Kittanning averages 3 feet 8 inches thick, ranging from 3 feet 2 inches to 4 feet thick. The bed is separated into two benches by a ¼ to 1 inch shale parting. The top bench is usually about 4 inches thick, and the bottom bench 3 feet 3 inches. The roof is shale and sandstone; the bottom, shale and fire clay.

In the western part of the township on Twomile and Higgins runs, the coal averages 3 feet thick, including a 3-inch bony bench at the top. The main bench of clean coal ranges from 2 feet 7 inches to 3 feet 6 inches thick. The roof is shale and sandstone; the bottom, shale and limestone.

Conemaugh township. The Upper Kittanning is very important in Conemaugh township. Most of the commercial mines are located along its outcrop west of Stony Creek. It is also mined by slope and shaft at Jerome. The coal increases in thickness south from Johnstown and averages about 4 feet thick, ranging from 3 feet to 5 feet 2 inches. In some localities the bed is clean, but usually it carries a thin bony streak at the top and a few inches of bony coal at the bottom. The roof is shale and sandstone; the bottom, shale and limestone. The coal is remarkably uniform and rolls are seldom encountered.

In the vicinity of Hollsopple and Foustwell the Upper Kittanning is locally 4 feet thick, averaging approximately 3 feet 6 inches. Locally it is very clean, but usually it is divided into two benches by a ¼ to 1 inch bone parting from 3 to 6 inches below the top. The top bench is usually clean, but in some places is bony and must be separated before the coal is shipped. The main bench ranges from 2 feet 4 inches to 3 feet 8 inches thick, and is clean coal. A local bottom bench, ranging from 4 to 12 inches thick, is present below the main bench but is not mined.

The Upper Kittanning is mined extensively in the vicinity of Jerome where it ranges from 4 to 5 feet thick. The average section is as follows: Shale roof; coal, bony, 10 inches; coal, clean, 2 feet 6 inches; sulphur and bone, 2 to 12 inches; coal, clean, 1 foot 6 inches to 4 feet; shale, 1 to 3 inches; coal, dirty (not mined), 6 to 10 inches; shale and limestone.

The Upper Kittanning coal has a columnar structure, is of medium hardness and stands shipment well. Locally it is rather high in sulphur and ash, but in general it is a good low-volatile coal.

Paint township. The Upper Kittanning, lying from 90 to 110 feet above the Lower Kittanning, has an extensive outcrop in Paint township, and can be mined by drift at most places. Although not as large a producer as the Lower Kittanning in this township, this bed has an excellent reputation as a steam and domestic fuel. Large mines are now operating in it.

In the vicinity of Windber the Upper Kittanning coal averages about 5 feet thick, ranging from 3 feet 6 inches to 6 feet. It is never entirely clean, being divided into two or more benches by shale partings. The coal varies much in physical character. Locally 12 inches at the top of the bed is bony coal, and is separated from the bench below by a shale parting ranging from ½ inch to 2 inches thick. The bench of coal beneath this parting ranges from 2 to 3 feet thick, and is separated from a lower bench by a black bony shale parting, ranging from 1 to 2 inches thick. The bottom bench of coal ranges from a few inches to 1 foot 10 inches thick. The roof is sandstone and shale; the bottom, limestone.

East of Windber on Paint Creek, and south of Windber on Seese Run, the Upper Kittanning ranges from 3 feet 6 inches to 5 feet thick, averaging 4 feet 6 inches. In these localities the Upper Kittanning is separated into two benches by a bone parting ½ inch to 2 inches thick. The top bench is usually about 2 feet thick, and the bottom bench ranges from 1 foot 10 inches to 2 feet 4 inches thick.

A bony coal, ranging from 3 to 6 inches thick, is present at the top of the bed. The roof is shale and sandstone, and the bottom, shale and fire clay.

The Upper Kittanning has the same physical and chemical character at Arrow, Hagevo, Hillsboro, and Landstreet. It varies much in thickness locally, but is invariably separated into two or more benches by thin shale and bone partings. It is of minable thickness practically everywhere.

In the vicinity of Hollsopple the Upper Kittanning is locally 4 feet thick, averaging 3 feet 4 inches. In many localities in this area it is free from partings. North of Hollsopple at Foustwell and Seanor and east of Stony Creek, the Upper Kittanning averages about 3 feet 6 inches thick, and is divided into two benches by a bone parting from $\frac{1}{4}$ to 1 inch thick, 3 to 6 inches below the top. The coal above this parting is usually good, but is locally bony and must be separated from the good coal. The bottom bench ranges from 2 feet 4 inches to 3 feet 8 inches thick, and is good clean coal. In some mines this bench has 12 to 18 inches of shale beneath it, and separating it from a bottom bench of coal ranging from 1 to 10 inches thick. This bottom bench is not mined. In some places in this part of the township the Upper Kittanning is rather high in sulphur, due to the presence of nodules and streaks of pyrite in the coal. These are readily picked out when the coal is mined.

Shade township. The Upper Kittanning is second only to the Lower Kittanning in importance, and has an extensive outcrop in Shade township. In the vicinity of Cairnbrook and Central City, the principal mining centers in the Upper Kittanning, the bed averages about 3 feet 6 inches, although locally it is 5 feet thick. The bed is entirely clean, with the exception of bone coal at the top ranging from 6 inches to 2 feet thick. Locally the top bench of coal, ranging from 1 to 8 inches thick, is present above this bony coal. The roof is shale and sandstone; the bottom, fire clay and limestone.

The Upper Kittanning is not being mined on a large commercial scale in Shade township east of Stony Creek. Numerous prospects and small mines indicate that the bed averages about 3 feet 6 inches thick in the western part of Shade township. In most places the coal is clean, but locally it is divided into two or more benches by thin bone and shale partings, and may have 2 to 8 inches of bone coal at the top.

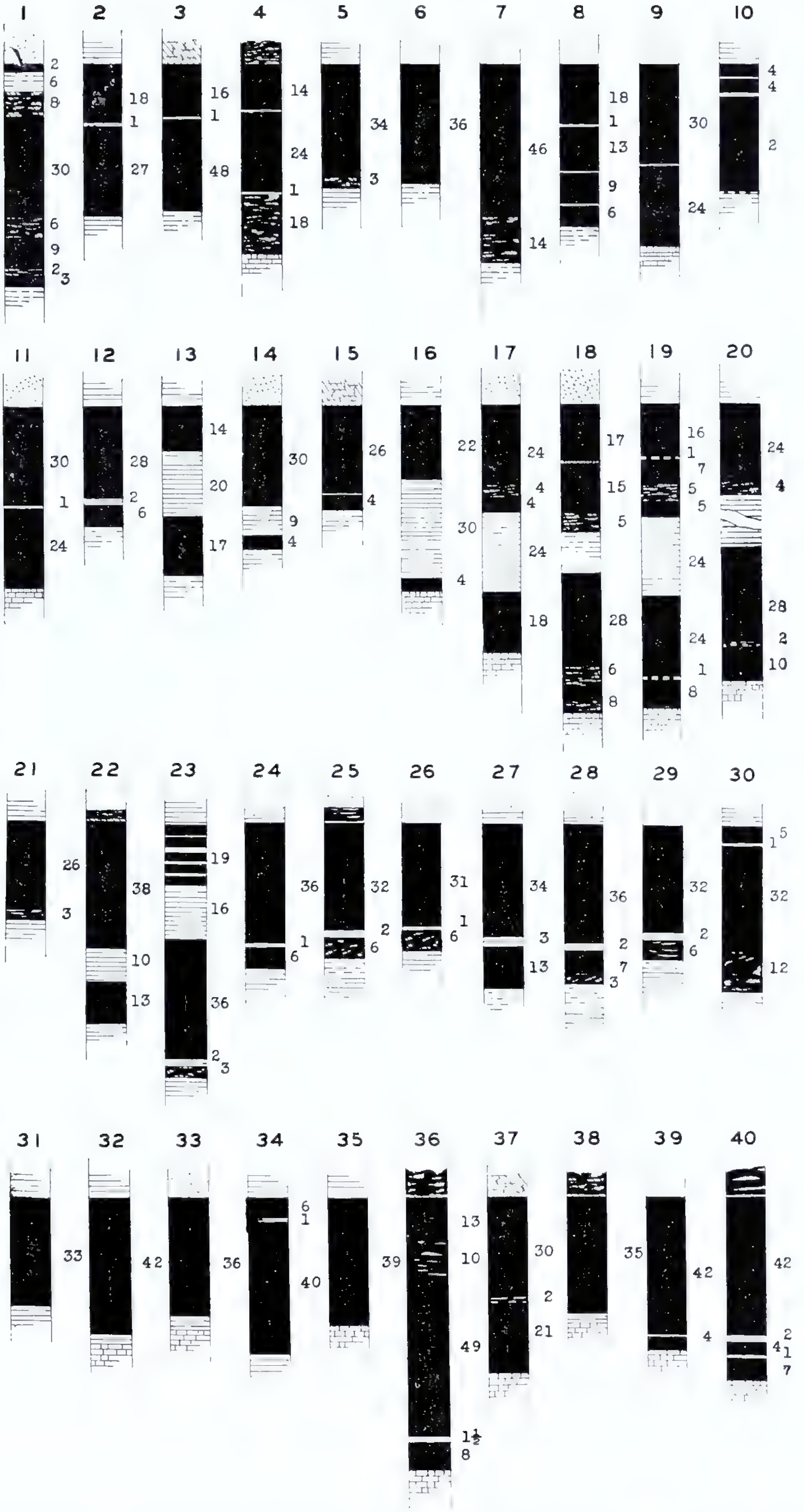


Figure 122. Sections of Upper Kittanning coal in Somerset County.

1. Edward Bitner. Farm mine, 1 mile southeast of Meyersdale, Summit township.
2. Romesburg Coal Company. Buffalo mine, 1 mile north of Garrett on Buffalo Creek, Brothers Valley township.
3. Enterprise Coal Company. Ponfeigh No. 1 mine, $\frac{1}{2}$ mile west of Hocking, on west slope of Buffalo Creek, Brothers Valley township.
4. Mountain Valley Coal Company. Garrett slope mine, at Hocking, Brothers Valley township.
5. Shober Coal Company. Shober mine, at Shober, Brothers Valley township.
6. Listonburg Coal Mining Company. Miller mine, at Listonburg, Addison township.
7. Addison Coal Company. Whites Creek mine, 1 mile east of Listonburg, Addison township.
8. Tri-State Consolidated Coal Companies, Inc. Tri-State No. 2 mine, at Listonburg, Addison township.
9. Shawnee Coal Company. Beachley mine, at Beachley, Addison township.
10. Kennerly Coal Mining Company. Kennerly mine, $\frac{3}{4}$ mile northwest of Beachley, on west slope of Whites Creek, Addison township.
11. Curry Coal Company. Anspach mine, $\frac{1}{2}$ mile north of Beachley on east slope of Whites Creek, Addison township.
12. Confluence Coal Company. Cougenour mine, $\frac{1}{2}$ mile south of Harnedsville, Addison township.
13. Ursina Fuel Company. Bridge mine, at Ursina, Lower Turkeyfoot township.
14. United Smokeless Coal Company. Baldwin No. 2 mine, in Smith Hollow 1 mile east of Humbert, Upper Turkeyfoot township.
15. United Smokeless Coal Company. Baldwin mine, 1 mile north of Humbert, Upper Turkeyfoot township.
16. Markleton Coal Company. Forge mine, $\frac{1}{2}$ mile north of Markleton, Upper Turkeyfoot township.
17. Casselman River Smokeless Coal Company. Casselman No. 1 mine, $\frac{1}{4}$ mile north of Markleton, Black township.
18. Marine Smokeless Coal Company. Marine mine, at Casselman, on Western Maryland Railroad, Black township.
19. Beaver North Side Coal Company. Casselman No. 1 mine, at Casselman, Upper Turkeyfoot township.
20. Meyersdale Smokeless Coal Company. Middle Creek mine, $\frac{1}{2}$ mile north of Casselman, Upper Turkeyfoot township.
21. Roberts Coal Mining Company. Roberts mine, $\frac{1}{4}$ mile west of Roberts Station, B. & O. Railroad, Somerset township.
22. Highland Coal Company. Highland mine, at Somerset, near B. & O. Station, Somerset township.
23. Listie Coal Company. Junior mine, $1\frac{1}{2}$ miles south of Listie, Somerset township.
24. Somerset and Cambria Smokeless Coal Mining Company. Big Six mine, $\frac{1}{4}$ mile west of Wells Creek, Somerset township.
25. Pennsylvania Smithing Coal Company. Adams No. 1 mine, at Wells Creek, Somerset township.
26. Georges Creek-Parker Company. Ritter No. 1 mine, at Coleman, Stony Creek township.
27. Royal Quemahoning Coal Company. Hite mine, 1 mile south of Stoyestown, on west bank of Stony Creek, Quemahoning township.
28. Quemahoning Valley Coal Company. Roy No. 7 mine, 1 mile southeast of Stoyestown, Quemahoning township.
29. Reading Iron Company. Reading No. 3 mine, at Reading No. 3 on Beaverdam Creek, Quemahoning township.
30. Bowman Fuel Company. Bowman No. 2 mine, $\frac{3}{4}$ mile southwest of Stoyestown, Quemahoning township.
31. Rowena Coal Company. Rowena No. 1 mine, at Rowena, Quemahoning township.
32. Somerset Creek Fuel Company. Somerset Creek No. 2 mine, $1\frac{1}{2}$ miles southwest of Hooversville on west slope of Stony Creek, Quemahoning township.
33. Old Colony Mining Company. Old Colony No. 2 mine, at Hooversville, Quemahoning township.
34. Berwind-White Coal Mining Company. Eureka No. 39 Upper mine, on south slope of Shade Creek, $1\frac{1}{2}$ miles southeast of Seanor, Paint township.
35. Pennsylvania Collieries. Pretoria No. 22 mine, $\frac{1}{4}$ mile southeast of Jerome Junction, Paint township.
36. Penn Smokeless Coal Company. Hyasota No. 1 mine, 1 mile southeast of Jerome, Conemaugh township.
37. Hillman Coal and Coke Company. Jerome Nos. 1 & 2 mines, at Jerome, Conemaugh township.
38. Randolph Coal Company. Randolph No. 1 mine, on Two Mile Run 1 mile east of Randolph, Quemahoning township.
39. Quemahoning Coal Company. Quemahoning No. 4 mine, $\frac{1}{2}$ mile northwest of Stoughton, Quemahoning township.

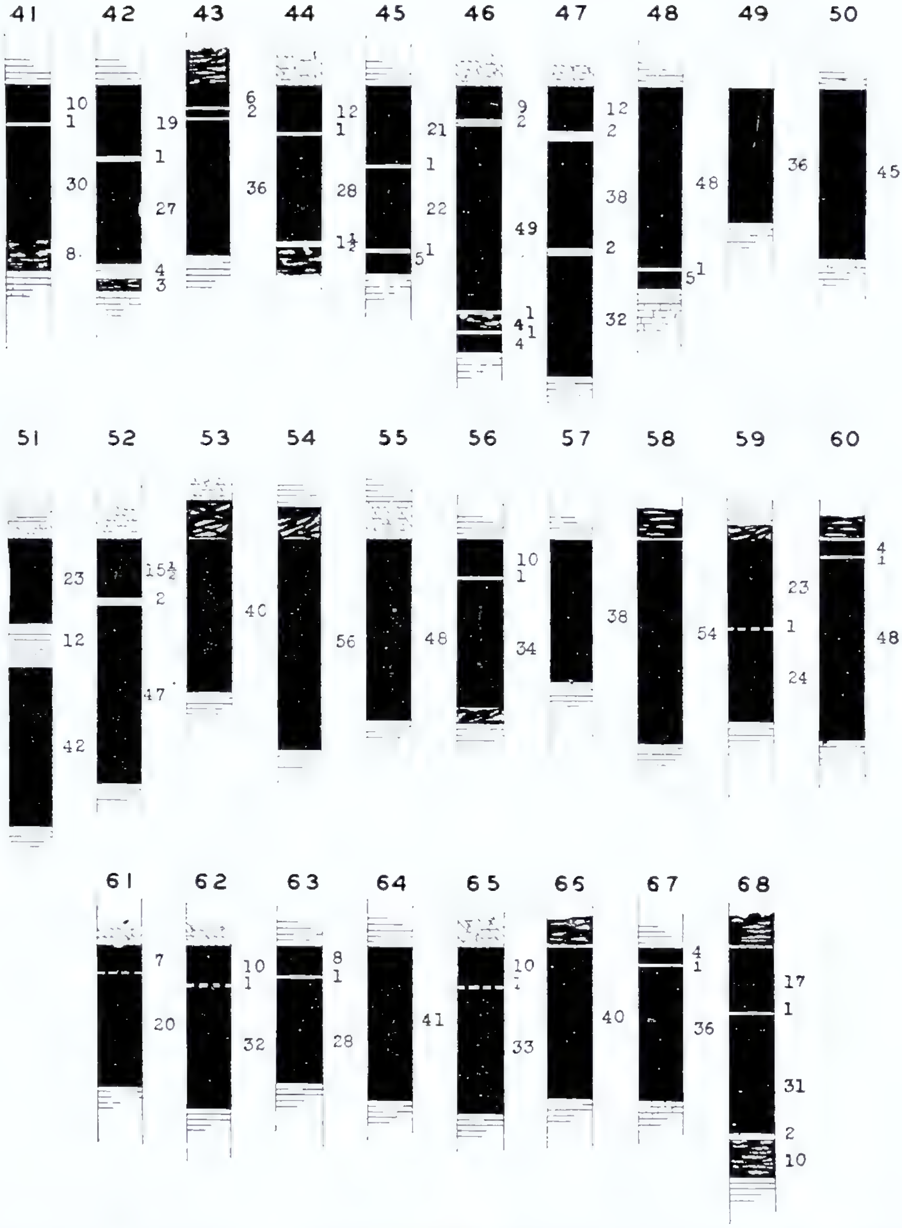


Figure 123. Sections of Upper Kittanning coal in Somerset County.

40. Quemahoning Coal Company. Ralphton No. 1 mine, at Ralphton, Jenner township.
41. Quemahoning Creek Coal Company. Que Creek No. 2 mine, ¼ mile south of Harrison, Lincoln township.
42. Consolidation Coal Company. No. 120 mine, at Acosta, Jenner township.
43. Hillworth Coal Company. Belmont No. 2 mine, ½ mile north of Acosta, Jenner township.
44. Forge Coal Mining Company. Forge No. 6 mine, 3 miles west of Jenners on Spruce Run, Jenner township.
45. Consoliation Coal Company. No. 125 mine, 4 miles southwest of Jenners on north branch of Quemahoning Creek, Lincoln township.
46. Consolidation Coal Company. No. 118 mine, at Jenners, Jenner township.
47. The Davis Coal & Coke Company. Orenda No. 2 mine, at Boswell, Jenner township.
48. Hillman Coal & Coke Company. Orenda Nos. 4 and 5 mines, 2 miles northwest of Glessner on Roaring Run, Jenner township.
49. Victor Coal Mining Company. Haws No. 1 mine, at Hollsopple, Conemaugh township.

50. Maple Ridge Coal Company. Maple Ridge No. 2 mine, 1 mile east of Hollsopple, Conemaugh township.
51. Grazier Coal Mining Company. Thermal No. 10 mine, ¾ mile north of Foustwell, Conemaugh township.
52. Jasahill Coal Mining Company. Knickerbocker No. 7-C mine, 1 mile southwest of Border Station, Conemaugh township.
53. Cambria Fuel Company. Cambria No. 1 mine, ¼ mile southwest of Paint Creek, Conemaugh township.
54. East Windber Coal Company. East Windber No. 4 mine, ¼ mile southeast of Kring Station, Conemaugh township.
55. Bird Coal Company. Bird No. 1 mine, 1 mile southwest of Kring Station, Conemaugh township.
56. Reitz Coal Company. Reitz No. 5 mine, 1 mile west of Paint, Paint township.
57. Somerset Windber Coal Company. Windber Fuel No. 5 mine, ½ mile southwest of Windber, Paint township.
58. Berwind-White Coal Mining Company. Eureka No. 35 upper mine, in Windber Borough, Paint township.
59. Lochrie Coal Company. Lochrie No. 1 mine, on east slope of Paint Creek 3 miles east of Windber, Paint township.
60. Lochrie Coal Company. Lochrie No. 3 mine, 2 miles east of Windber on south slope of Paint Creek, Paint township.
61. Imperial Coal Corp. Shade Creek No. 3 mine, on north slope of Miller Run, 1½ miles northwest of Cairnbrook, Shade township.
62. Arrow Coal Mining Company. Arrow No. 6 mine, 1 mile northeast of Cairnbrook, on east slope of Dark Shade Creek, Shade township.
63. Ines Coal Company. Ines No. 1 mine, on Laurel Run, 2 miles east of Cairnbrook, Shade township.
64. Loyal Hanna Coal & Coke Company. Loyal Hanna No. 7 mine, at Central City. Shade township.
65. Reitz Coal Company. Reitz No. 3 upper mine, 1 mile south of Central City, on west slope of Dark Shade Creek, Shade township.
66. Reitz Coal Company. Reitz No. 7 mine, 1½ miles southeast of Central City on west slope of Dark Shade Creek. Shade township.
67. Haskin Coal Mining Company. Haskin No. 3 upper mine, on west bank of Coal Run. 1⅓ miles east of Reels Corners, Shade township.
68. Shipley Coal Mining Company. Shipley No. 1 mine, 3 miles east of Macdonaldton, near Stony Creek town, Stony Creek township.

Lower Freeport (D) Coal.

The Lower Freeport coal, lying approximately 50 feet below the Upper Freeport, averages 3 feet thick in Somerset County, but is only locally of commercial value. This bed is mined at a few places on Buffalo and Coxes creeks. When prices are high it is also mined with varying success in the vicinity of Rockwood where it has a maximum thickness of 5 feet 4 inches, including impurities. A large shale and bone binder near the middle of the bed, which is characteristic in most localities, increases production costs and lowers the quality of the run-of-mine coal, as this binder can not be completely removed by picking.

The Lower Freeport is thickest in Somerset and Quemahoning townships, chiefly in the vicinity of Friedens in northern Somerset County.

The Lower Freeport is a thin, extremely irregular bed, outcropping on both flanks of the basin in Elk Lick township. Although the quality is good, numerous prospects have found only local areas of merchantable coal.

The Lower Freeport coal ranges from 8 inches to 3 feet thick in Summit township. It is opened for local use on the eastern slope of Negro Mountain near Handwerk school. It is divided into two benches by 12 inches of fire clay. The upper bench is 2 feet 8 inches thick; the lower bench, which is 2 feet thick, has many blades of bone and pyrite. The only commercial mine in this bed in 1925 was at Garrett where the bed averages 2 feet 10 inches thick, including two thin bone partings. The coal has fairly good quality.

The Lower Freeport coal is present in large areas in Brothers Valley township but is opened principally on Buffalo Creek. It is also opened in the eastern and northern parts of the township for local use. On Buffalo Creek the bed ranges from 1 foot 10 inches to 3 feet 2 inches thick, and contains one or more local bone partings. The bed is very lenticular and is subject to rolls on roof and bottom which make the thickness very irregular. The coal is high in ash and sulphur.

In Black township the Lower Freeport coal outcrops on the hills on the eastern bank of Coxes Creek, and on Casselman River southwest of Rockwood the bed averages about 2 feet 6 inches thick. The top bench, which is 1 foot 9 inches thick, is fairly clean and is separated from an impure bottom bench by a bone and shale parting averaging 18 inches thick. The bottom bench is rarely loaded for shipment.

The Lower Freeport coal is mined on Coxes Creek north of Rockwood in Milford township, where it averages 3 feet 6 inches thick. A bone parting ranging from 7 to 14 inches thick, separates the bed into two benches. The top bench averages 2 feet 3 inches thick, and the lower ranges from 8 inches to 1 foot 8 inches thick. Locally there is another thin bench of coal on the bottom ranging from 2 to 6 inches thick. This bench is not mined.

The Lower Freeport outcrops east of Somerset on the Bedford pike, and along Wells Creek in the vicinity of Listie, Wells Creek, and Friedens in Somerset township. It has been mined for several years in the vicinity of Friedens, and is highly prized as a smithing coal. It has also been mined at a great number of places for local use where the thickness ranges from 2 feet 6 inches to 4 feet 2 inches. The bed usually occurs as a single bench of clean coal.

In the vicinity of Listie and Adams the bed averages 3 feet 6 inches of clean coal. It has a single persistent 1/16-inch parting near the middle. The roof is shale; the bottom, fire clay.

In the vicinity of Friedens the bed is a single bench averaging 2 feet 9 inches thick. The roof is gray shale; the bottom, hard fire clay.

In Stony Creek township the Lower Freeport outcrops east of Wells and Stony creeks in a general northeast-southeast line running half a mile west of Shanksville and Boone. The only commercial mines in this bed are in the vicinity of Stoyestown, where the bed ranges from 2 feet to 3 feet 6 inches thick, averaging about 3 feet. Locally the bed is divided into two benches by a shale parting ¼ inch thick or less. The top bench is usually about 18 inches, and the bottom bench from 4 to 10 inches thick. In other localities, where the bed is divided into three benches by shale partings 1 to 2 inches thick, the top bench is usually about 2 feet 1 inch, and the middle and bottom benches are 6 to 10 inches thick. The bottom is limestone and fire clay; the roof, shale and sandstone.

The Lower Freeport is persistent in Lincoln township, but appears to be subject to great irregularity in thickness. Drill hole records indicate that it is of minable thickness in some localities where it occurs in a single bench, ranging from 18 inches to 3 feet 2 inches thick. It outcrops on the eastern slope of Laurel Hill and ranges from 6 inches to 4 feet 3 inches thick.

The Lower Freeport is not being mined in Jenner township because its thickness and quality do not compare favorably with adjoining beds. This bed is subject to great irregularity in thickness and quality, ranging from a few inches to 4 feet thick, and from a high ash and sulphur coal to a coal having an excellent reputation in adjoining townships as a smithing coal. It has been prospected at a great many places in the township, and is practically everywhere separated into two or more benches by shale and bone partings. Bony coal 2 to 8 inches thick is present at the top of the bed.

The Lower Freeport is irregular in thickness in Quemahoning township, and is not being mined commercially at the present time. It ranges from 6 inches to 3 feet 6 inches thick, averaging approximately 2 feet. It is usually a clean coal, but is locally separated into two or more benches by partings of shale and bone.

The Lower Freeport outcrops along Stony Creek in Conemaugh township, but is not being mined at present because of the proximity of the thicker beds. It ranges from a few inches to 4 feet thick, averaging less than 2 feet 6 inches. It is usually clean, but locally is split into two or more benches by bone and pyrite partings ranging from 2 to 10 inches thick.

The Lower Freeport coal has been eroded from large areas in Paint township. It is present in the hilltops in the vicinity of Windber, and north of Hillsboro and Seanor. It also outcrops along Paint Creek east and southeast of Windber. This bed is not being mined for commercial shipments because of the presence of thicker beds of better quality. In some localities it is 4 feet thick, but it averages less than 2 feet 6 inches. It is usually a clean bed, but is locally split into two or more benches by bone and pyrite partings.

The Lower Freeport has a long outcrop on the western flank of Allegheny Mountain, both flanks of Negro Mountain, and the eastern flank of Laurel Hill. Although it is not as persistent and regular in thickness as the Upper Freeport it is of minable thickness and quality locally.

UPPER FREEPORT (E) COAL.

The Upper Freeport coal, lying at the top of the Allegheny group, is thickest in Jenner, Conemaugh, Lincoln, Somerset, and Quemahoning townships. It ranges from 2 feet 8 inches to 6 feet thick, and produces approximately 1,000,000 tons annually. The Upper Freeport is also mined in the southern part of the Berlin-Salisbury basin and on Buffalo and Coxes creeks. The bed is generally thin, averaging about 2 feet 6 inches, and has fairly good quality. The bed is subject to rolls both on the roof and bottom which make mining rather hazardous. The Upper Freeport coal is used for steam and domestic purposes.

The Upper Freeport coal, outcropping about halfway up the slope of Negro and Savage mountains in Elk Lick township, is being mined by drift for local use. This bed gives more promise of future value than any other coal in the Allegheny group. It averages 3 feet thick in Elk Lick township. The largest production comes from the vicinity of Engles Mill and Boynton where 3 feet is the common thickness. The physical character of the bed varies greatly in short distances. However, there are always two or more shale partings varying from 1 to 14 inches thick. The coal is soft and friable but is excellent for steaming purposes. This bed has also been opened by farmers for domestic use on the eastern slope of Negro Mountain. On the headwaters of Tub Mill Run it is 2 feet 4 inches thick and has excellent quality, but as this region is practically uninhabited and little prospecting has been done, it is impossible to say whether this thickness and quality are general.

Brothers Valley township. The Upper Freeport is a thin but very good coal throughout Brothers Valley township. It is used for local fuel in the eastern and northern parts of the township, but its commercial development is limited to Buffalo Creek valley, where it is easily accessible by drift well up the slopes of the hills. The bed averages 2 feet 6 inches thick, is very irregular, and only locally contains one or two thin bone partings. In some mines 12 inches of dirty bony coal is on the bottom. This is mined only when additional height is desired.

Black township. The Upper Freeport coal outcrops and is mined by drift high on the hills on the eastern slope of Coxes Creek and on Casselman River southwest of Rockwood in Black township. The bed varies much in thickness and quality locally, and has no characteristic impurities with the exception of small lenses of pyrite.

The bed ranges from 2 feet 4 inches to 3 feet 8 inches thick in the Coxes Creek valley. A top bench ranging from 18 inches to 2 feet 6 inches thick is fairly good coal. Below this main bench are several smaller benches of coal alternating with thick bone binders. This bottom coal is not mined. The coal is thickest under a shale roof.

Stony Creek township. The Upper Freeport coal outcrops a short distance above the Lower Freeport in Stony Creek townhip. It is being mined commercially east of Mostoller, where it averages about 5 feet thick, including impurities. A draw slate about 6 inches thick is present at the top. The bed is divided into four benches of coal as follows: Top bench coal 6 inches; bone coal 1 inch; main bench clean coal 2 to 3 feet; shale 1 inch; coal 4 inches; shale 1 inch; coal 10 inches; canneloid coal 12 inches. The bottom is fire clay; the roof, sandstone.

The Upper Freeport coal is mined in several places by farmers for local use. It varies much in thickness and quality, and is never clean. It is doubtful whether this coal will have the great future importance which the Upper and Lower Kittanning undoubtedly will enjoy.

Somerset township. The Upper Freeport coal is mined in the vicinity of Somerset in Somerset township. It averages 3 feet 6 inches thick in the southern part of the township. The roof is bony coal, underneath which is a bench of clean coal ranging from 2 to 3 feet thick. Beneath this clean bench are three or four smaller benches of coal separated by thick bone partings. A small and extremely irregular rider bed lies about 18 feet above the Upper Freeport, and ranges from 3 to 6 feet thick. This coal is canneloid in character and has an ash content ranging from 10 to 20 per cent. At one or more places this bed is mined and sold locally as a cannel coal.

The Upper Freeport is the most extensively mined coal in the northern part of the township, probably because it is the most easily accessible. It ranges from 2 feet 8 inches to 3 feet 10 inches thick, averaging 3 feet 6 inches. It is always separated into two or more benches by shale partings which vary much in thickness at different localities.

In the vicinity of Somerset the bed is generally 3 feet 5 inches thick, including impurities. A bone coal, usually about 6 inches thick, is present at the top of the bed. The divisions below the bone coal are as follows: Main bench of clean coal, 2 to 3 feet thick; shale parting ½ to 2 inches; coal 3 to 6 inches; shale parting 1 inch; bony coal 2 inches.

Along the Baltimore and Ohio Railroad between Somerset and Geiger the Upper Freeport coal averages 3 feet thick, including impurities. The bed contains 1 or 2 inches of bony coal at the top; a main bench underneath, 2 feet 7 inches thick; parting 1 inch; coal 2½ inches; shale parting 1 inch; dirty coal 1½ inches.

Between Geiger and Friedens, particularly in the vicinity of Listie, the coal averages 3 feet 6 inches thick. The bed usually has 4 to 6 inches of bony coal at the top. The main bench is usually 2 feet 8 inches thick, and is separated from a middle bench 4 inches thick, by a shale parting 1 inch to 1½ inches thick. The middle bench is separated from an impure bottom bench usually about 4 inches thick, by a shale parting ranging from ½ inch to 1 inch thick. The bottom is fire clay; the roof, shale.

Addison township. In Addison township the Upper Freeport has been prospected at several localities along Youghiogheny and Casselman rivers, but only locally does it have the good quality and thickness of the adjoining Upper Kittanning coal. The Upper Freeport is rarely over 2 feet thick. It is mined in the vicinity of Somerfield where the bed ranges from 4 to 6 feet thick, including a clay parting in the middle ranging from 16 inches to 2 feet 4 inches thick. The upper bench is a coal of good quality, but the lower bench is locally very impure. The geology of this district has not been studied in detail, and as the reports of prospecting are very meager it is impossible to give more definite information. Numerous outcrops indicate that two or more beds may have future value, as they may be mined in conjunction with beds of limestone and fire clay.

Turkeyfoot townships. In Upper and Lower Turkeyfoot townships the Upper Freeport has promise of value when the more important beds have been mined out. At Humbert the Upper Freeport has a maximum thickness of 5 feet 6 inches, including impurities. The top coal, 2 feet 2 inches thick, is usually clean. The middle part of the bed has numerous thin bony partings. The bottom coal, ranging from 10 inches to 2 feet thick, has good quality.

Lincoln township. The greatest production in Lincoln township comes from the Upper Freeport. It is mined extensively by drift in the vicinity of Sipesville and Acosta. It averages about 3 feet 8 inches thick in the township, ranging from 3 to 5 feet. The bed is separated into three benches by shale partings. Drill hole records and outcrops at points where it is not being mined at present indicate that the coal is very regular in thickness and is of minable quality practically everywhere.

In the northern part of this township, where the bed is now being mined extensively, it is usually divided into three benches. The section from the top down is: Bony coal 4 to 10 inches; top bench coal 1 foot 10 inches to 3 feet 2 inches; shale parting ½ to 2 inches; middle bench 4 to 8 inches; shale parting ½ to 3 inches; bottom bench 4 to 10 inches. The bottom bench is usually clean, but locally contains numerous small knife blades of bone and pyrite. The bottom is fire clay; the roof, sandstone.

Jenner township. The Upper Freeport is very important in Jenner township, where it is mined by drift, shaft, and slope along the Baltimore and Ohio and Western Maryland railroads. The coal outcrops along Quemahoning Creek and its tributaries, on the east and west slopes of the Boswell anticline, and along the eastern slope of Laurel Hill on the headwaters of Beaverdam Run and North Branch of Quemahoning Creek. It averages 4 feet thick throughout the township, ranging from 3 to 5 feet. This coal enjoys an excellent reputation as a steam, domestic, and railroad fuel.

In the vicinity of Acosta the bed averages 3 feet 10 inches thick. It includes a bony coal at the top, a main bench of coal 2 feet 6 inches to 3 feet 10 inches thick, shale parting 1 to 2 inches, middle bench 4 to 6 inches, shale parting ¼ to 1 inch, lower bench 7 to 8 inches. The bottom is fire clay; the roof, shale.

In the vicinity of Critchfield and Ralphton the coal averages 3 feet 11 inches thick, but is not being mined extensively at present. A bony coal bench 6 inches thick is present at the top of the bed. Shale partings ½ to 2 inches thick separate the bed into a main bench of clean coal 2 feet 8 inches to 3 feet 4 inches thick, middle bench 4½ inches thick, and a bottom bench, present locally, 2 to 4 inches thick. The bottom is fire clay; the roof, shale.

In the vicinity of Coal Junction and on the Western Maryland Railroad the Upper Freeport averages 4 feet thick. The characteristic 8-inch bony coal overlies the following section: Main bench clean coal 3 feet; shale ½ to 1½ inches; middle bench 4½ inches; shale, 1 to 3 inches; lower bench, dirty, and sulphurous, 7 inches. The bottom is fire clay; the roof, sandstone.

The bed along the Western Maryland Railroad varies much in physical character, often being separated into several benches by 1 to 4 inch shale partings. A main bench of clean coal ranging from 2 feet 8 inches to 3 feet 10 inches thick is always present.

In the northern part of the township, in the vicinity of Boswell, the Upper Freeport coal averages 3 feet 8 inches thick. Six inches at the top is bony. The bed is divided by 1-inch shale partings into a main bench of clean coal 3 feet thick, a middle bench 3 inches thick, and a lower bench 4 inches thick. The bottom is shale and fire clay; the roof, sandstone.

Quemahoning township. The Upper Freeport is mined commercially on the Boswell Branch of the Baltimore and Ohio Railroad in the western part of Quemahoning township. It averages 3 feet 4 inches thick, and is extremely impure in some localities. The main bench ranges from 2 feet 6 inches to 3 feet thick, and is overlain by a bony bench 3 to 8 inches thick. It is separated from a bottom bench 3 inches thick, of variable quality, by a 1 to 2 inch shale parting. This bench is separated from a lower bench of dirty coal, by a shale parting 1 inch thick.

On Stony Creek the Upper Freeport varies much in physical character, but is of minable thickness at most localities. It is always divided into two or more benches by shale and bone partings, the main bench ranging from 2 feet to 3 feet 6 inches thick. From 2 to 8 inches of bony coal is always present at the top of the bed. The roof is sandstone and shale; the bottom, fire clay and shale.

Conemaugh township. The Upper Freeport, outcropping on Stony Creek and on the South Fork of Bens Creek near Thomas Mills, is not an important producer at present in Conemaugh township. It is being mined at one locality on Stony Creek where it averages 2 feet thick. It is inclined to be faulty and rolly, and usually carries large amounts of bone and pyrite. Drill hole records west of Stony Creek indicate that it is of minable thickness in many localities, ranging from 2 feet to 4 feet 6 inches thick.

Paint Township. The Upper Freeport, lying 45 to 60 feet above the Lower Freeport, outcrops in practically the same areas as the Lower Freeport in Paint township. It also is of minor importance, and has never been a commercial producer, chiefly because it is inclined to be faulty, and the acreage is small. Locally the bed is 3 feet 6 inches to 4 feet thick, but generally averages less than 2 feet 6 inches. It may be of some future importance, particularly for local fuel, when the thicker beds of better quality have been exhausted.

Shade township. In Shade township the Upper Freeport outcrops southeast of Hooversville along Fallen Timber Run northeast of Buckstown, northeast of Reels Corners, south of Central City, east of Cairnbrook, and north of Hooversville. This bed is not producing coal for commercial shipment at present. The entire output is being used by farmers. The thickness of the bed varies greatly in different localities. It ranges from a few inches to 5 feet thick, and its physical character is extremely variable. It locally occurs in a single bench rarely exceeding 3 feet thick. In other localities it has a maximum thickness of 6 feet, including impurities, which are usually two to four bone and shale partings ranging from a few inches to one foot thick.

CONEMAUGH COALS.

Somerset County has the distinction of being the only county in Pennsylvania containing Conemaugh coals of minable thickness in large areas. Many of these beds will have future importance when the thicker Allegheny and Monongahela coals have been exhausted.

The Conemaugh group contains a total of eighteen coal beds, five of which are of minable thickness in numerous localities, particularly in the Berlin-Salisbury basin.

The Lower Bakerstown coal (Thomas coal of West Virginia and Maryland), lying 240 feet above the Upper Freeport, is opened by farmers on the eastern slope of Negro Mountain. The bed ranges from 12 inches to 3 feet 10 inches thick. Where thin the coal is excellent, but in most localities the bed has numerous small bone partings. The Lower Bakerstown coal is opened on Casselman River one mile southeast of Garrett, where it averages 2 feet 6 inches thick including one ¼-inch shale parting and one ½-inch bone parting. The coal is fair in quality.

The Upper Bakerstown coal (Maynadier coal of Maryland), lying 40 feet above the Lower Bakerstown, averages about 2 feet thick in the Berlin-Salisbury basin, but west of Negro Mountain its horizon is represented by several feet of bituminous shale. This coal has not been prespected to any great extent, but local outcrops indicate that it may have some commercial value.

The Bakerstown coals outcrop on both flanks of Negro Mountain, particularly on Tub Mill Run. The Lower Bakerstown coal, opened for farm use, ranges from 18 inches to 3 feet 2 inches thick. It is extremely dirty. The Upper Bakerstown coal is thinner but of better quality.

The Barton coal, lying 490 feet above the Upper Freeport, averages 12 inches thick, and has excellent quality. Locally it has a maximum thickness of 2 feet 6 inches, and is mined by farmers for domestic fuel. The bed is extremely lenticular and subject to squeezes. The Barton coal has been opened at one place on Tub Mill Creek, and ranges from 2 feet to 3 feet 2 inches thick. Underneath this is a 5-foot bed of clay excellent for making brick.

The Wellersburg coal at its type locality at Wellersburg in Southampton township, Somerset County, has a maximum thickness of 5 feet. It has been opened for local use. This bed is thin and unimportant in Somerset County west of Allegheny Mountain. It lies 315 feet below the Pittsburgh bed in the Berlin-Salisbury basin.

The Lonaconing coal (Elk Lick coal of Rogers), lying about 160 feet below the Pittsburgh, is very thin, except on Elk Lick Creek where it has a maximum thickness of 4 feet and is being mined for local use.

A coal, locally known as the Elk Lick, lying about 160 feet below the Pittsburgh, has been correlated in this report with the Lonaconing of Maryland. This bed has an unusual local thickness of 4 feet on Elk Lick Creek. It was formerly mined for local use. The physical character of the bed is extremely variable, but three or more shale partings from 1 to 2 inches thick are always present. The coal is rather high in ash and sulphur.

The Little Pittsburgh coal has been opened near Wellersburg, and ranges from 2 feet 8 inches to 2 feet 10 inches of clean coal of fair quality, with one 2-inch bone parting.

PITTSBURGH COAL.

The Pittsburgh coal was formerly the chief producer in the Berlin-Salisbury basin, where it was preserved by the Berlin syncline. This area is now practically exhausted and production is limited to pulling pillars and working crop coal.

The Pittsburgh bed occurs in the Wellersburg basin in Southampton township, which is a continuation of the Georges Creek basin of Maryland. The Georges Creek basin has produced enormous tonnages of excellent steam coal for many years. Unfortunately the main bed, the Pittsburgh, becomes dirty and inferior in quality in the vicinity of Wellersburg. This small district has had a very small production and has never been fully prospected. Diamond drilling will probably prove that this field has one or more excellent coal beds in the Allegheny and Conemaugh groups.

The production of this district is confined to the Pittsburgh bed which occurs in the hilltops north of Wellersburg. The bed averages 8 feet thick, but only 5 feet 6 inches is merchantable coal. Many shale and bone partings make mining difficult and the coal must be picked before it is shipped. The quality is below the standard of the Pittsburgh bed, the sulphur and ash content being rather high.

A local occurrence of the Pittsburgh coal is at Glessner. The bed has been mined on a small scale in a few hilltops until it is practically exhausted.

The Pittsburgh bed has been almost entirely exhausted in Elk Lick township. The bed averages about 7 feet thick. At Salisbury the coal is in five benches, 5 inches, 12 inches, 2 feet 6 inches, 3 feet, and 2 feet 9 inches thick, separated by several ½ to 2 inch bone partings. The Pittsburgh bed ranges from 5 feet 6 inches to 6 feet 6 inches thick at Coal Run. It always has two or more thin bone partings. Production is limited to one stripping operation and a few mines which are pulling pillars and mining crop coal.

The Pittsburgh bed thins northward from Elk Lick township and the partings increase in thickness. South of Casselman River the production from the Pittsburgh bed is limited to the pulling of pillars in the old mines. On the hills north of Meyersdale, where the bed is extremely thin and poor in quality, it is mined by drift. The bed ranges from 2 feet 8 inches to 4 feet thick, and contains two or more bone partings ranging from 3 to 10 inches thick. Locally the bed contains numerous sulphur balls. One mile southwest of Miller School the bed is 5 feet 10 inches thick including a bottom bench of

2 feet 6 inches of dirty coal which is not mined for shipment, and also 6-inch bone parting 18 inches from the top. At Shaw Mines the Pittsburgh bed is divided into three benches. The top bench averages 5 feet 10 inches thick and has excellent quality. A 10-inch binder of shale (blackjack) separates this bench from a middle bench which averages 7 inches thick. A 6-inch shale parting separates the middle from the lower bench, which is 1 foot 10 inches thick. Locally these two lower benches are of good quality and are loaded, but they are left in most mines.

The Pittsburgh bed is being mined on the hilltops north of Meyersdale. It ranges from 3 to 4 feet thick, and is extremely variable in physical character. The best coal is contained in a top bench ranging from 1 foot 10 inches to 2 feet 2 inches thick. Other thin coal benches are present below it.

As a result of several years' study by the Maryland and Pennsylvania Geological Surveys, the Pine Hill No. 2 bed has been correlated as the stratigraphic equivalent of the Pittsburgh bed, and the Pine Hill No. 1 bed as the Sewickley. This correlation has met with the approval of mining engineers in this district.

The Pittsburgh bed is mined by drift in the vicinity of Pinehill where it ranges from 2 feet 8 inches to 4 feet 6 inches thick. The bed is never entirely free from impurities. A lower bench, ranging from 8 inches to 2 feet 10 inches thick, is usually full of sulphur streaks. The upper part of the bed commonly is parted by two or more shale binders ranging from ¼ inch to 12 inches thick. In general the bed is very regular. Locally sandstone faults partly cut out the bed. This coal is used for steaming purposes. It is picked by the miners and on the car before shipment.

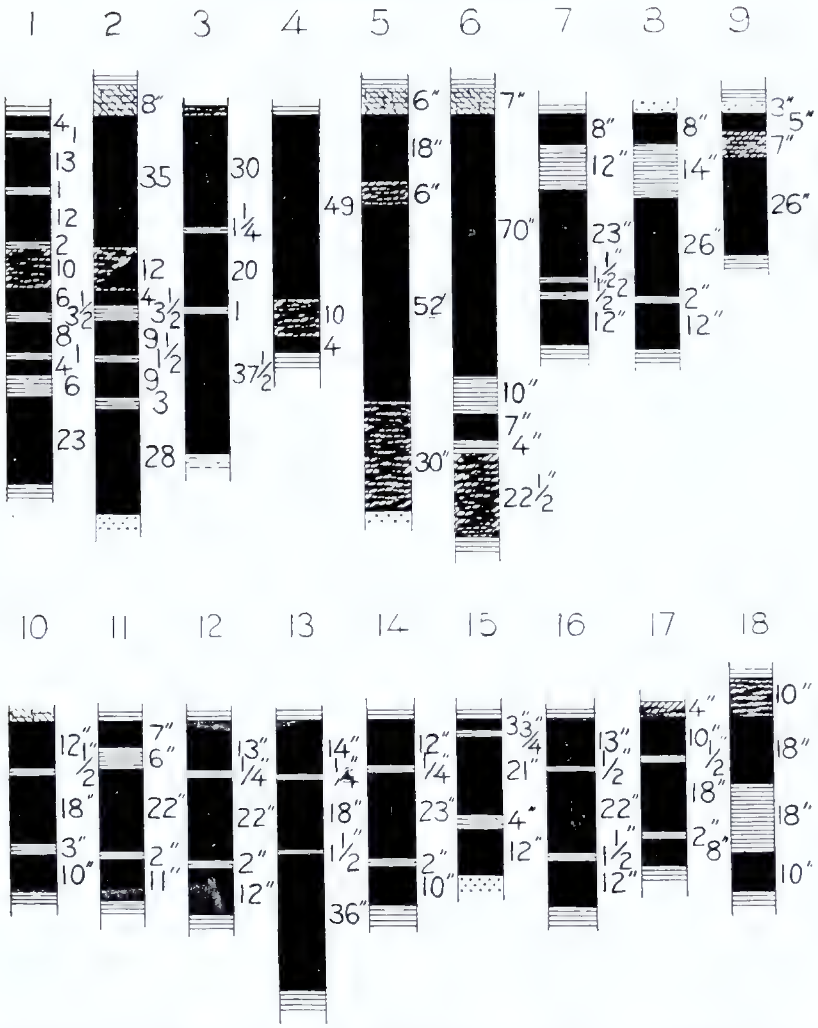


Figure 124. Sections of Pittsburgh coal in Somerset County.

1. C. J. Rowe & Bros. Rowe mine, ¼ mile northeast of Wellersburg Boro., Southampton township.
2. C. J. Rowe & Bros. Rowe mine (Section No. 2), ¼ mile northeast of Wellersburg Boro., Southhampton township.
3. Boynton Coal Company. Chapman No. 3 mine, ¾ mile north of Salisbury, Elk Lick township.
4. Consolidation Coal Company. Mine No. 107, ¾ mile northwest of Boynton, Elk Lick township.
5. Atlantic Big Vein Coal Company. Keystone No. 1 mine, west slope Casselman River 1 mile southeast of Shaw Mines, Summit township.
6. Consolidation Coal Company. Mine No. 104, at Shaw Mines, Summit township.
7. Berkley Coal Company. Berkley mine, on hill ¼ mile north of Meyersdale, Summit township.
8. E. Statler & Son. Statler mine, on hill ½ mile northwest of Meyersdale, Summit township.
9. Schell Coal Company. Horner mine, ¾ mile northwest of Meyersdale, Summit township.
10. B. A. McDonnell Coal Company. Bittner No. 1 mine, at Pine Hill, Brothers Valley township.
11. The Consolidation Coal Company. Mine No. 113, at Pine Hill, Brothers Valley township.
12. Pine Hill Fuel Company. Gambert No. 2 mine, at Pine Hill, Brothers Valley township.
13 Diamond Coal Company. Diamond mine, at Pine Hill, Brothers Valley township.
14. C. J. Rowe & Bros. Wills No. 1 mine, at Pine Hill, Brothers Valley township.
15. Quality Smokeless Coal Company. Quality No. 2 mine, at Pine Hill, Brothers Valley township.

16. Stoner Coal Company. Stoner No. 1 mine, at Berlin Station, Brothers Valley township.
17. John O. Ream. Ream No. 1 mine, at Berlin Station, Brothers Valley township.
18. Outcrop near Glessner, Jenner township.

PITTSBURGH RIDER COAL.

The Pittsburgh Rider, lying at an average interval of 25 feet above the Pittsburgh bed, is now the most important coal in the district south of Meyersdale. It averages about 4 feet thick but is inferior in quality to the Pittsburgh bed.

The bed is mined by drift well up on the slopes of the hills in the center of the Berlin-Salisbury basin, west and northwest of Boynton, in Elk Lick township. The bed averages 4 feet 2 inches thick. At Salisbury it is 5 feet 2 inches thick including several thin shale partings; at Boynton the coal is 3 feet 8 inches thick not including two 6-inch shale partings; on Coal Run it averages 4 feet 4 inches thick not including 4 feet of impure roof coal. The main bed is generally divided into two or more benches by 1 to 4 inch bone partings. The quality is much inferior to that of the Pittsburgh, but it is a good steam coal. Much of the bed in this township is lost by undermining in the Pittsburgh bed.

The Pittsburgh Rider is mined by drift in the hilltops south of Meyersdale, principally at Shaw Mines in Summit township. It averages 4 feet 6 inches thick, but invariably contains three or more thin bone partings which are removed carefully in mining. Although it does not have the thickness or quality of the Pittsburgh bed, it is extensively mined on the properties where the Pittsburgh bed has been mined out. It yields a large percentage of the total output of the basin. The coal is mined in Summit township in the hills north of Meyersdale. It averages 3 feet 4 inches thick and is divided into two benches by a shale parting ¼ inch thick. The top bench is 16 inches thick, and the bottom bench 2 feet thick.

In Brothers Valley township the bed is the stratigraphic equivalent of the Platt coal of the Pennsylvania Second Geological Survey. This bed is extremely irregular in thickness and variable in quality, and no commercial mines are worked in it. Its horizon is usually represented by several feet of coal mixed with thick shale partings or carbonaceous shale.

This bed is locally known as the Redstone, but stratigraphic studies have lead to the conclusion that it is the equivalent of the Pittsburgh Rider coal of Fayette County.

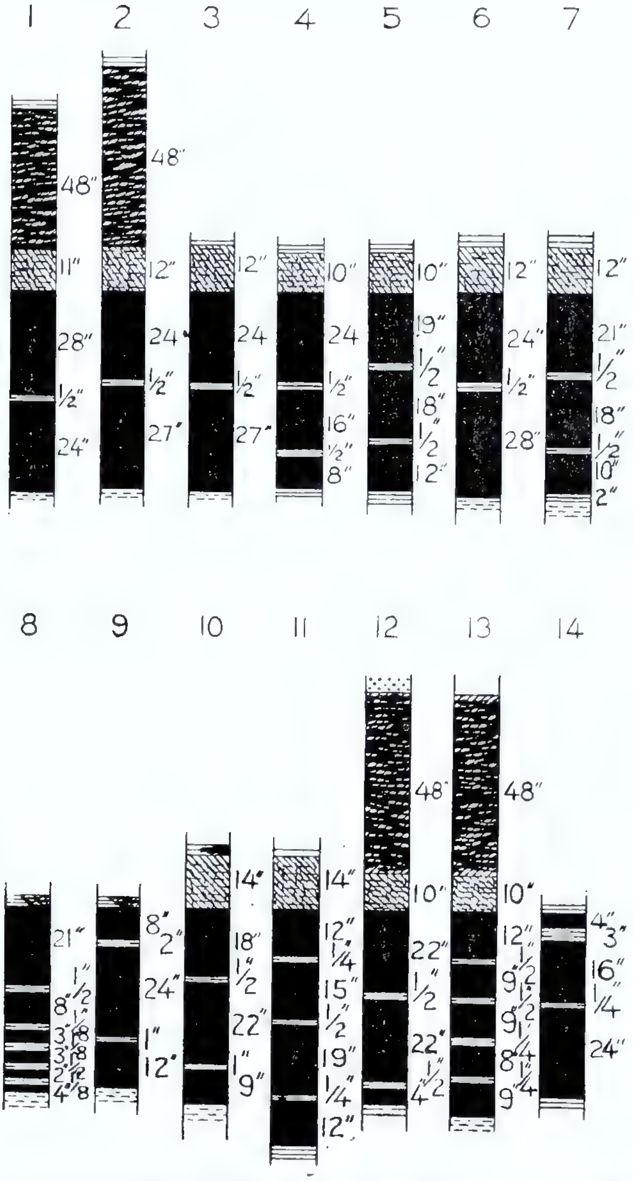


Figure 125. Sections of Pittsburgh Rider coal in Somerset County.

1. Harding Coal Company. Margaret mine, 1 mile northwest of Boynton near Coal Run, Elk Lick township.
2. George T. Bowman & Company. Chapman No. 1 mine, at Coal Run town, Elk Lick township.
3. Grassy Run Coal Company. Grassy Run No. 2 mine, at Coal Run town, Elk Lick township.
4. N & S Coal Company. Woodrow mine, 1 mile north of Coal Run town, near Pleasant Hill school, Elk Lick township.
5. Meyersdale Fuel Company. Fuel No. 1 mine, 1 mile north of Coal Run town, Elk Lick township.
6. Grassy Run Coal Company. Grassy Run No. 3 mine, 1 mile north of Coal Run town, Elk Lick township.
7. Meyersdale Fuel Company. Fuel No. 3 mine, ½ mile north of Coal Run town, Elk Lick township.
8. The Consolidation Coal Company. Mine No. 107, ½ mile east of Coal Run town, Elk Lick township.
9. C. K. Bowman & Company. Hamilton mine, 1 mile north of Boynton, Elk Lick township.
10. Atlantic Big Vein Coal Company. Keystone No. 2 mine, 2 miles south of Meyersdale on west bank of Casselman River, Summit township.

11. Meyersdale Fuel Company. Fuel No. 2 mine, 1 mile west of Shaw Mines, Elk Lick township.
12. Consolidation Coal Company. Consolidation No. 105 mine, ½ mile northwest of Shaw Mines, Summit township.
13. C. J. Rowe & Bros. Mystic mine, ½ mile southeast of Shaw Mines, Summit township.
14. Stotler Bros. Pleasant Hill mine, ½ mile northwest of Meyersdale on Western Maryland Railroad, Summit township.

REDSTONE COAL.

The Redstone coal, lying 45 feet above the Pittsburgh, is thin and unimportant in Somerset County. It occurs only in the hills in the Berlin-Salisbury basin, and is not mined.

SEWICKLEY COAL.

The Sewickley coal, capping the hilltops northwest of Coal Run, is thin and impure, and will never be of commercial value.

The Sewickley coal is mined by drift near the tops of the hills in the vicinity of Pinehill and Berlin. The bed ranges from 3 feet to 4 feet 6 inches thick, averaging about 4 feet. Invariably it has a bony coal or draw slate roof. The main bed is separated by bone or shale partings, ranging from ¼ inch to 4 inches thick, into three or more benches. Locally it occurs in a single bench 3 feet 10 inches thick.

CHAPTER XXII.

TIOGA COUNTY

INTRODUCTION.

The coal-bearing groups of Tioga County are contained in two canoe-shaped synclinal basins. The first and most important, the Blossburg basin, extends in a general northeast-southwest direction, across Ward, Covington, Hamilton, Bloss, Duncan, Liberty, and Morris townships. The largest acreages of coal are in Ward, Hamilton, Bloss, and Duncan townships; the other townships contain only a few outlying areas.

The second, or Gaines basin, extending diagonally across the county a few miles north of and approximately parallel to the Blossburg basin, has preserved a few small areas of coal in northern Gaines township, and one small area in northern Delmar township.

Tioga County has four minable coal beds, three of which are or have been mined for shipping coal. These beds, situated in small basins, in a region that is otherwise lacking in coal, have had great local importance for many years.

Practically all the highways in the coal districts of Tioga County are improved. They are used for hauling coal to local consumers. During times of high prices these roads were also used for transporting coal to railroad sidings.

The Blossburg district is served by the Erie Railroad which runs through Morris Run, Blossburg, Arnot, Landrus, Morris, and Hoytville. The New York Central Railroad runs south to Antrim from Wellsboro. The Buffalo and Susquehanna Railroad serves the Gaines district.

COALS.

The most important coal bed, the Bloss, has been correlated as the Lower Kittanning. This correlation has not been proved definitely, but will be used by this Survey until more detailed work is done. The correlation of the other beds is even more uncertain.

The coals of Tioga County are generally soft and friable, and break up into slack and small lumps, irregular cubes in shape. They have long been classed as semi-bituminous and are used with great success as steam and blacksmithing coals. They range from 17 to 24 per cent volatile matter; 60 to 72 per cent fixed carbon; 6 to 18 per cent ash; and .69 to 3 per cent sulphur.

Bear Creek Coal.

The Bear Creek coal, lying from 20 to 40 feet below the Bloss bed, is very irregular in thickness and quality. At Fallbrook it ranges from 12 inches to 2 feet 6 inches thick, averaging about 1 foot 8 inches. It is a good, semi-bituminous coal, but higher in ash than the Bloss. At Morris Run this bed is reported 2 feet 6 inches thick; it averages less than 2 feet thick at Arnot and Antrim. This coal will be important after the Bloss has been exhausted.

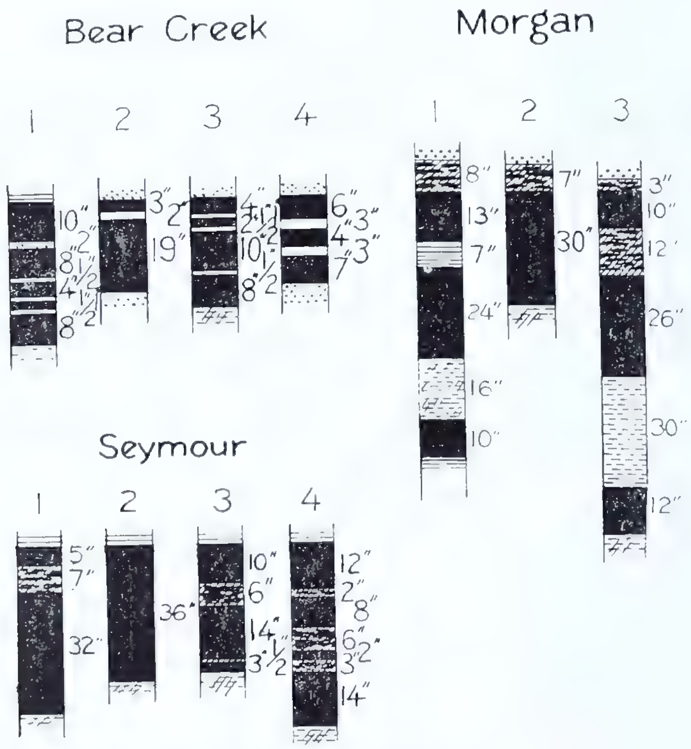


Figure 126. Sections of coal beds in Tioga County.

BEAR CREEK COAL.

1. Nowak Coal Company. Coal Run mine, on Coal Run, Blossburg Boro.
2. O'Donnell Bros. East Side mine, at Morris Run, Hamilton township.
3. Outcrop under Bloss bed at Arnot, Bloss township.
4. Outcrop on south side of main road ⅛ mile east of Antrim, Duncan township.

MORGAN COAL.

1. Morris Run Coal Mining Company. Mine No. 16, at Morris Run, Hamilton township.
2. Morris Run Coal Mining Company. Mine No. 8, at Morris Run, Hamilton township.
3. O'Donnell Bros. East Side mine, near Morris Run, Hamilton township.

SEYMOUR COAL.

1. Morris Run Coal Mining Company. Jones No. 13 mine, at Morris Run, Hamilton township.
2. Scott Jenkins. Jenkins mine, in Blossburg Boro.
3. Outcrop at Arnot, Bloss township.
4. Outcrop at Antrim, Duncan township.

BLOSS (LOWER KITTANNING ?) COAL.

The Bloss is the most important coal in Tioga County. It has been a large producer for many years, and is rapidly being exhausted. At Fallbrook it ranges from 2 feet 6 inches to 4 feet thick, averaging 2 feet 8 inches; locally a bone parting, 8 inches thick, is present about 6 inches above the bottom. At Morris Run the coal averages 5 feet thick, is regular and has excellent quality. At Arnot the Bloss bed averages 2 feet 10 inches thick, and is divided into irregular benches by two to four bone partings, ranging from 1 to 8 inches thick. The coal ranges from 2 to 3 feet thick at Antrim and generally carries one or two bone partings 1 to 6 inches thick. An average of eight analyses of the Bloss coal gives: volatile matter 19.74, fixed carbon 68.97, sulphur 0.68, and ash 9.13 per cent.

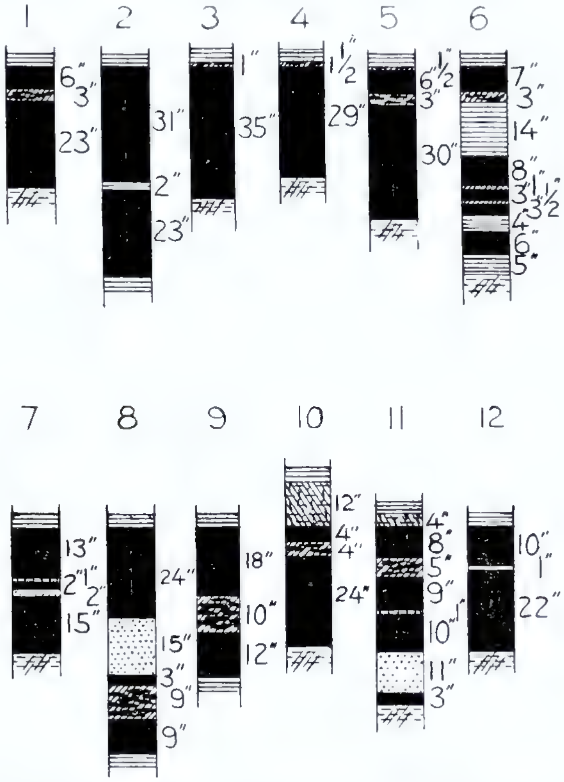


Figure 127. Sections of Bloss coal in Tioga County.

1. Bloss Vein Coal Company. Merriditli mine, on South Mountain near Blossburg Borough line.
2. Morris Run Coal Mining Company. No. 7 mine, at Morris Run, Hamilton township.
3. Morris Run Coal Mining Company. No. 1 slope, at Morris Run, Hamilton township.
4. Morris Run Coal Mining Company. Mine No. 12, at Morris Run, Hamilton township.
5. Bower Coal Company. Bower No. 5 mine, at Blossburg.
6. Blossburg Coal Company. Arnot No. 1 mine, at Arnot, Bloss township.
7. Blossburg Coal Company. Arnot No. 2 mine, at Arnot, Bloss township.
8. Blossburg Coal Company. Arnot No. 5 mine, at Arnot, Bloss township.

9. Blossburg Coal Company. Maple Hill mine, at Arnot, Bloss township.
10. Flower Run Coal Company. Flower Run mine, 1½ miles west of Blossburg, Bloss township.
11. Fall Brook Coal Company. Anna S. mine, 1 mile west of Antrim, Duncan township.
12. Fall Brook Coal Company. Antrim Nos. 1 and 2 mines, near Antrim, Duncan township.

MORGAN COAL.

The Morgan coal, lying about 40 feet above the Bloss coal, is generally of minable thickness, but is invariably full of clay, shale, and bone partings. At Fallbrook it is 2 feet 1 inch thick, including a 3 inch shale parting, 10 inches above the bottom. Both benches contain numerous knife blades of pyrite and bone. At Morris Run, Arnot, and Antrim the bed ranges from 12 inches to 3 feet thick, and is too dirty to be mined profitably at present.

The sections in figure 126 are typical of the Morgan coal in Tioga County.

SEYMOUR COAL.

The Seymour bed, lying about 140 feet above the Bloss bed, will be important in the future. It is 2 feet 8 inches thick at Fallbrook; 2 feet 6 inches at Morris Run; at Arnot 2 feet 8 inches; at Antrim it is locally 5 feet thick, but averages less than 3 feet. The coal is very high in sulphur.

Several other thin coal beds, lying at different intervals above and below the Bloss bed, are thin and unimportant.

The following sections are typical of the Seymour coal in Tioga County.

GAINES DISTRICT

The Gaines coal basin is at Gurnee on the crest of the mountain 4 miles northeast of Gaines. The coal is in the Pottsville series 160 feet above the Sharon conglomerate.

"Coal has been known to occur in the Gaines basin for half a century or more and was actively exploited about twenty-five years ago (1875). At that time careful examinations were undertaken and openings on coal were made at many points, on the basis of which a minutely detailed geologic section showing the presence of eleven coals, four of which were reported to be 3 feet or more in thickness, was made out. On the basis of this section and the accompanying report a company was organized, a railroad built up the side of the mountain from Lansing, 700 feet below, and a mine opened on the most promising bed, then known as the Knox and Billings coal. This coal proved to be of good quality and to possess a fairly persistent thickness of about 3 feet, and was actively mined for a number of years. The mining developments, however, brought to light unexpected dips, and the coal, instead of underlying the whole of the broad flats of the mountain top, was found to underlie an area of less than a square mile. It also gradually became certain that the many openings, supposedly on different coals, were in reality on a single bed, with the exception of a 3-inch bed occurring 15 or 20 feet above the top of the conglomerate. The area was long ago exhausted of all the coal that could profitably be mined by the larger company, and the mines were practically abandoned, though they have since been reopened and are still worked on a small scale by Mr. P. Smith, who was foreman of the company.

"The coal is cuboidal and on a fresh surface is seen to consist of deep black, shiny layers alternating with duller partings of amorphous carbon. It is rather soft and friable and carries considerable sulphur. Its coke is also friable but meets the requirements of good blacksmiths' coal, for which use it is in considerable demand. It is popular in the surrounding country for general heating purposes, and at the present time is also in demand as a fuel in the nearby oil field."

The foregoing quotation is from the Gaines folio of the Geologic Atlas of the United States, published by the United States Geological Survey in 1903.

In the summer of 1921, L. H. Woodcock, R. D. No. 4, Westfield, who lives at Gurnee, opened a drift mine near the top of a hill at Gurnee and in August, 1922, was employing five miners to supply a steady local demand for coal. The drift at that time was 120 feet long. The thickness of the bed is as follows:

Coal bed in Woodcock mine, Gaines district.

Main heading	inches
Laminated bone	2
Bright coal	5
Dirt	0½
Bright coal	2
Dirt	1
Dull coal	14
	24½

Second left room	inches
Laminated coal	1
Dull coal	7
Bone	1
Dull coal	10
Bone	1½
Dull coal	1½
	22

CHAPTER XXIII.

WASHINGTON COUNTY

INTRODUCTION.

Washington County has been one of the most important coal producers in Pennsylvania for many years. It contains approximately 40 per cent of reserve Pittsburgh coal in the State. Several coal beds other than the Pittsburgh are minable and can be expected to maintain the large output when the thicker and more accessible coal has been exhausted. Some of the beds above the Pittsburgh are now being mined, but development has not reached the beds below that coal, because they lie at great depth and little is known of their quality or persistence.

There are thirty coal beds in the county, many of which are a few inches thick, and only eight are locally workable. The Pittsburgh bed is the most persistent and important coal. The Waynesburg and Washington beds are greatly valued as producers of domestic fuel; the Redstone bed is also locally workable, but the Sewickley is generally very thin.

Washington County has ample transportation facilities, both by water and rail. The Monongahela Division of the Pennsylvania Railroad follows the west bank of Monongahela River along the eastern border of the county; a branch of this division runs southwest from Monongahela City to Marianna, serving the mining towns in that district. The Chartiers and Southern Railroad, now under construction, will connect with the Pennsylvania system at Marianna and run north from that point through Carnegie to Pittsburgh. Another branch runs from Pittsburgh to Washington, where it connects with the Waynesburg and Washington Railroad, the latter railroad continuing south to Waynesburg. The Pennsylvania Railroad from Pittsburgh to Steubenville, Ohio, and the west, crosses the northern part of the county. The Pittsburgh and West Virginia Railroad crosses the county parallel and a few miles south of the latter railroad. The Baltimore and Ohio Railroad from Pittsburgh enters the county near the northeastern corner and runs through Washington and Claysville to the western boundary of the county.

Monongahela River is another means of transportation for the coal mined in the river district. A large part of the yearly production is loaded in barges destined to points along Ohio River.

Washington County has many miles of improved roads and a great many good dirt roads that are used extensively for the transportation of coal to railroad sidings and to local consumers.

Many transportation routes, the excellent quality of the coal, and its proximity to a ready market make Washington County a large contributor to Pennsylvania's coal production.

Washington County is a maturely dissected region. The surface is hilly. The streams have eroded their valleys to a fairly uniform grade and their numerous small branches have cut the uplands into narrow ridges and hills with gentle slopes. Elevations in the county range from 800 to 1500 feet above sea level. Points above 1300 feet are rare.

STRUCTURE.

There are eleven major structural features in the county, all of which have a direct effect upon the position and mining of the coals. The features having a general northeast-southwest trend are: Belle Vernon anticline, Waynesburg syncline, Amity anticline, Nineveh syncline, Washington anticline, Finney syncline, Claysville anticline, and West Middletown syncline. Cross Creek and McMurry synclines cut across West Middletown and Nineveh synclines almost at right angles in the northwest part of the county. The Pan Handle trench, in the vicinity of Bridgeville in the northeastern part of the county, is another peculiar local structural feature.

Belle Vernon anticline is an important structure in eastern Washington County. Where it enters the county at the extreme southeastern corner, the Pittsburgh coal has an altitude of 840 feet. The axis rises rapidly northward and the Pittsburgh bed has an altitude of 1,000 feet one mile north of Pike Run. The fold increases slowly in height to the south branch of Maple Creek where a sharp dome marks the greatest development of the structure, with the Pittsburgh bed at an elevation of 1060 feet. The axis plunges irregularly to the northeast and at the mouth of Maple Creek the Pittsburgh coal has an altitude of 1,000 feet.

Waynesburg syncline is a broad structural trough lying northwest of Belle Vernon anticline. The dips are gentle, averaging less than 100 feet per mile, and the bottom is broad and flat. At the Greene County line the Pittsburgh coal has an elevation of less than 400 feet, but rises gradually northeast to approximately 700 feet above tide on Pigeon Creek.

Amity anticline crosses the county from the south center to the northeast corner, and is a broad structure with gentle dips on both flanks. The Pittsburgh coal rises from an elevation of 450 feet on Ten Mile Creek to a maximum of 1040 feet in the Peters Creek region.

Nineveh syncline, which enters the county close to the Waynesburg Railroad and leaves it just west of the Chartiers Railroad, is a shallow trough having an average width of 9 miles. The axis varies much in elevation. Near Conger the Pittsburgh coal has an elevation of about 350 feet; northeast in the vicinity of Gambles, it rises to 700 feet and reaches a maximum elevation of 1040 feet along this axis at Houston.

Washington anticline extends from the Chartiers Creek district southwest into Greene County. The northern part of the structure is broad and flat, with the Pittsburgh coal at elevations of 950 to 1050 feet along its axis. The axis changes greatly in elevation, especially in the southwestern part of the county, forming a series of domes. The eastern flank dips rather sharply into the Nineveh syncline; the western flank has a general dip toward the Finney syncline.

Finney syncline extends from the town of Washington to the southwestern corner of the county. It is broad and irregular on the south and rises and narrows rapidly to the northeast. It is composed of a series of troughs along a common axis.

Claysville anticline enters the county about two miles north of the southwestern corner and extends in a general northeast direction to a few miles north of Gretna. This anticline is practically a continuous chain of alternating domes and saddles which vary greatly in elevation, width, and depth.

West Middletown syncline enters the county a few miles south of Buffalo Creek and trends northward to Murdocksville. The east-west structure has broken the syncline into a series of basins which have rather high, and in most part, very regular dips.

Cross Creek syncline originates near the town of Cross Creek and extends eastward to Nineveh syncline. This minor structure forms one of the basins on the axis of the West Middletown syncline. The dips on both flanks are gentle. Its axis varies greatly in elevation. McMurry syncline, a minor structure, originates in a low depression of Nineveh syncline near Morganza, and extends east to the county line. The dips on both flanks are gentle and regular, and its axis rises northeastward.

STRATIGRAPHY.

The outcropping rocks of Washington County are river alluvium, the Carmichaels formation of Quaternary age, and the Greene, Washington, Monongahela, and Conemaugh groups of Carboniferous age. The thickness of outcropping consolidated rocks is about 1190 feet.

Drill holes have reached below the Catskill group of Devonian age, but no workable coal beds are recorded below the Allegheny group.

The Carmichaels formation is found on terraces along river valleys. It is composed of unconsolidated deposits of gravel, sand, clay, and silt. The youngest deposits in the county are sand and silt deposited by the streams during high water. Their thickness ranges from a few feet along the smaller streams to 40 feet along Ohio River. The flood plains are a few feet to a mile wide.

The Greene group has been eroded from large areas in the northern part of the county; in the southern part where some areas remain practically intact, its total thickness is approximately 350 feet. No coal beds of commercial importance are found in this group, which is chiefly composed of shales, thin sandstones, and limestones.

The Washington group has a maximum thickness of 400 feet; its average thickness is much less. It is composed of soft shaly sandstones, shales, a few thick limestones, and two workable coal beds.

The Monongahela group is the most important coal-bearing group in the county. It is composed of sandstones, shales, limestones, and three workable coal beds, one being the Pittsburgh.

The outcrop of the Conemaugh group is limited to the stream valleys in the northern part of the county. The group is about 550 feet thick, and is composed of gray or greenish shale, sandstone, thin limestones, and a number of unworkable coals.

The Allegheny group does not outcrop in the county, but its characteristics are known from drill records. It is composed chiefly of sandstones, shales, coal beds, and thin limestones, and averages 275 feet thick. Two minable coals of variable thickness have been recorded in a few drill records.

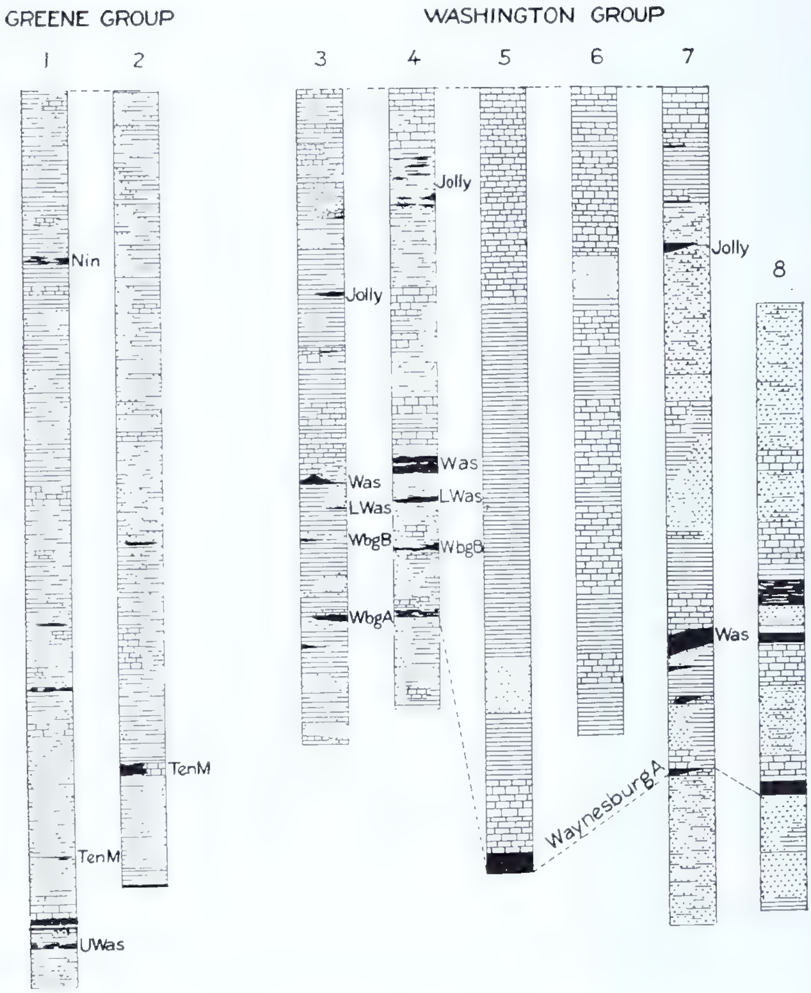


Figure 128. Stratigraphic sections. Washington County.

1. Generalized section of the Greene group. U. S. G. S. Claysville Folio.
2. Generalized section of the Greene group. U. S. G. S. Amity Folio.
3. Generalized section of the Washington group. U. S. G. S. Burgettstown-Carnegie Folio.
4. Generalized section of Washington group. U. S. G. S. Claysville Folio.
5. Washington group, 2 miles southeast of Old Concord. U. S. G. S. Claysville Folio.
6. Washington group, 1½ miles south-southeast of Crothers. U. S. G. S. Claysville Folio.
7. Generalized section of Washington group. U. S. G. S. Amity Folio.
8. Generalized section of Washington group. U. S. G. S. Brownsville-Connellsville Folio.
9. Generalized section of Monongahela group. U. S. G. S. Burgettstown-Carnegie Folio.
10. Generalized section of Monongahela group. U. S. G. S. Claysville Folio.
11. On Robinson Run. Monongahela group. U. S. G. S. Claysville Folio.
12. On Chartiers Creek, Monongahela group. U. S. G. S. Claysville Folio.
13. Monongahela group, 1½ miles south-southeast of Crothers. U. S. G. S. Claysville Folio.
14. Generalized section of Monongahela group. U. S. G. S. Amity Folio.
15. Monongahela group, Borough of Washington. U. S. G. S. Amity Folio.
16. Monongahela group, ¾ mile east of Munntown. U. S. G. S. Amity Folio.
17. Monongahela group, ½ mile north of Beallsville. U. S. G. S. Amity Folio.
18. Monongahela group, ½ mile southwest of Beallsville. U. S. G. S. Amity Folio.
19. Monongahela group, 1¼ miles northwest of Deemston. U. S. G. S. Amity Folio.

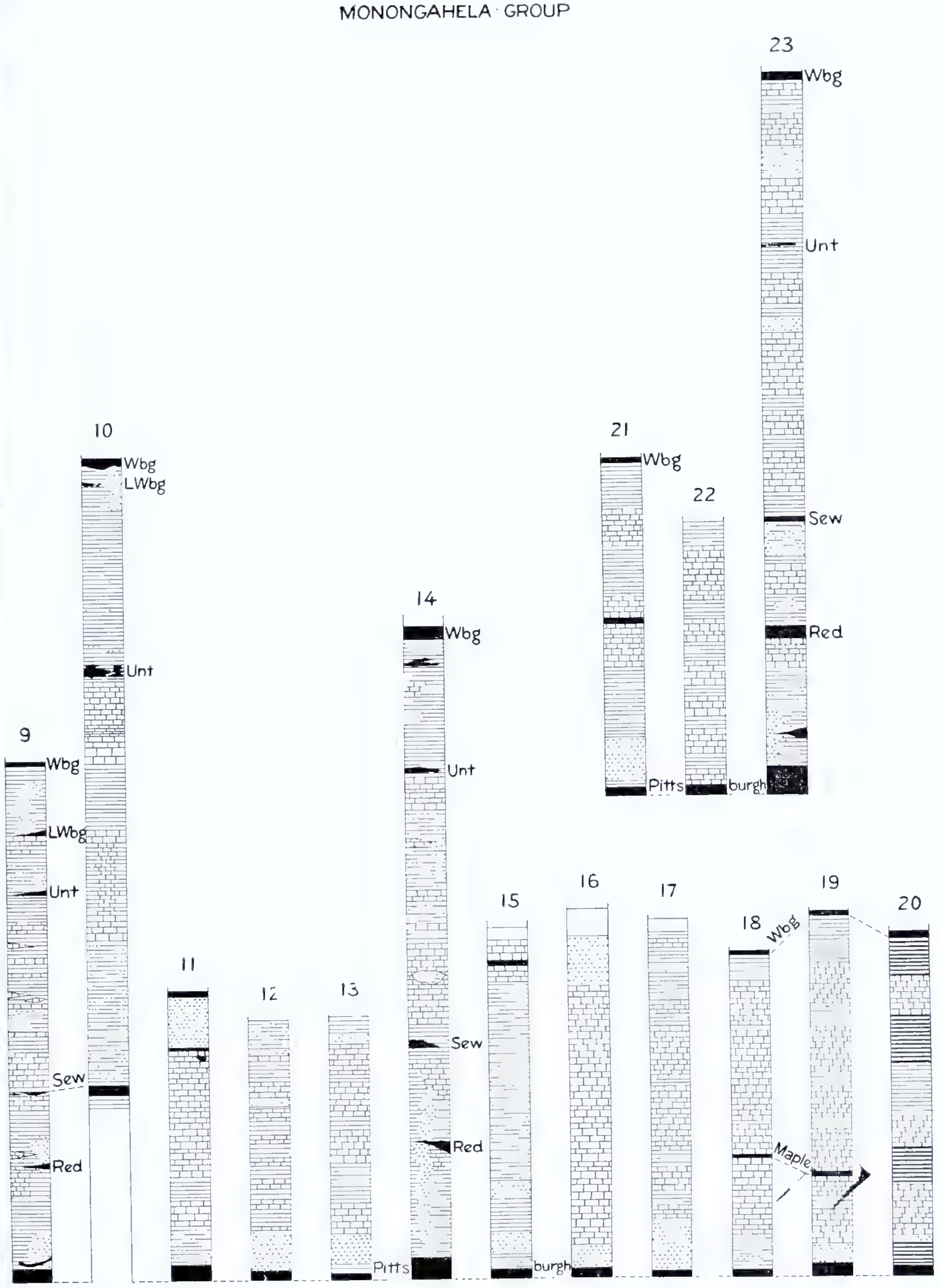


Figure 129. Stratigraphic sections cont'd. Washington County.

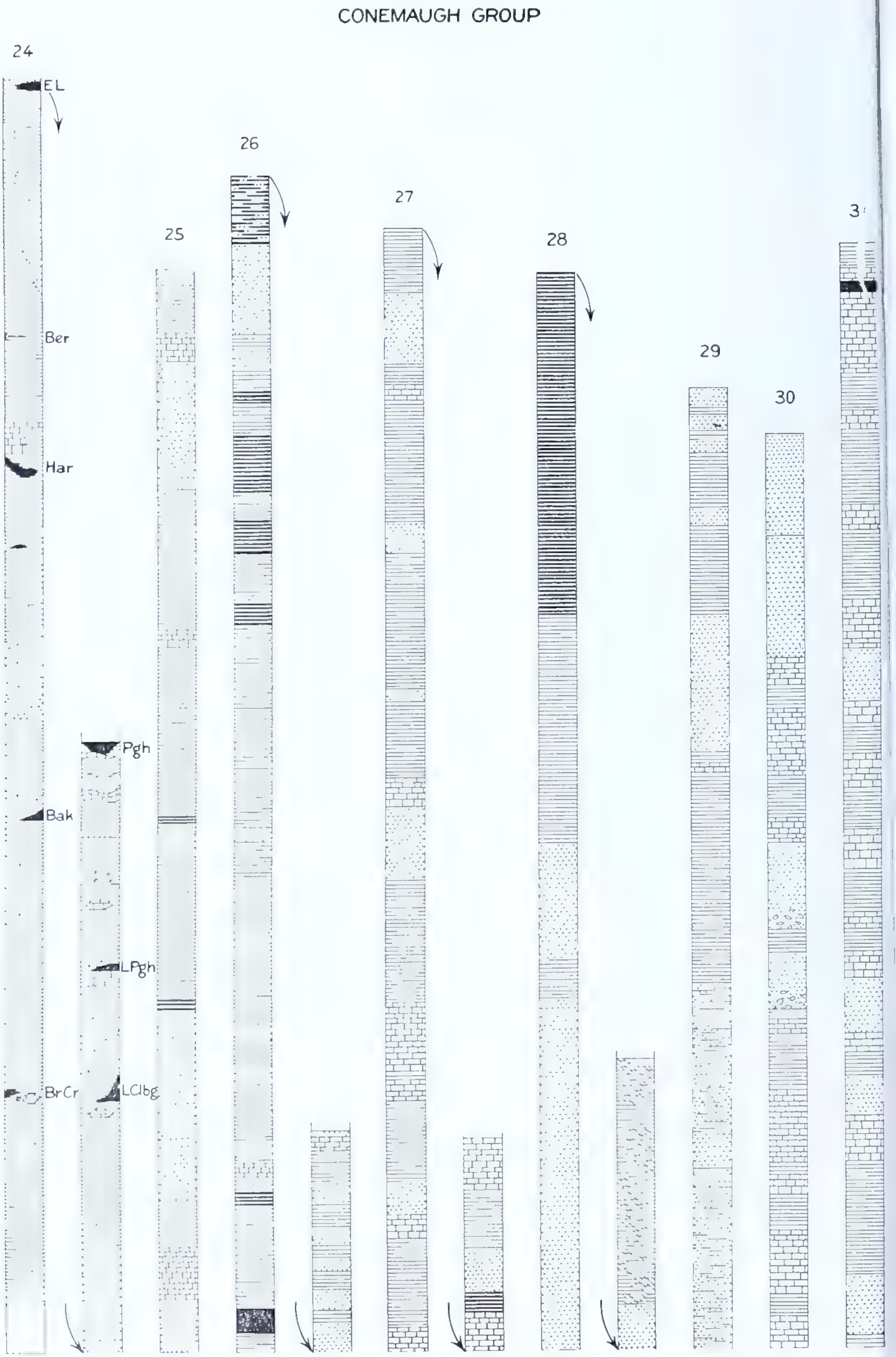


Figure 130. Stratigraphic sections cont'd. Washington County.

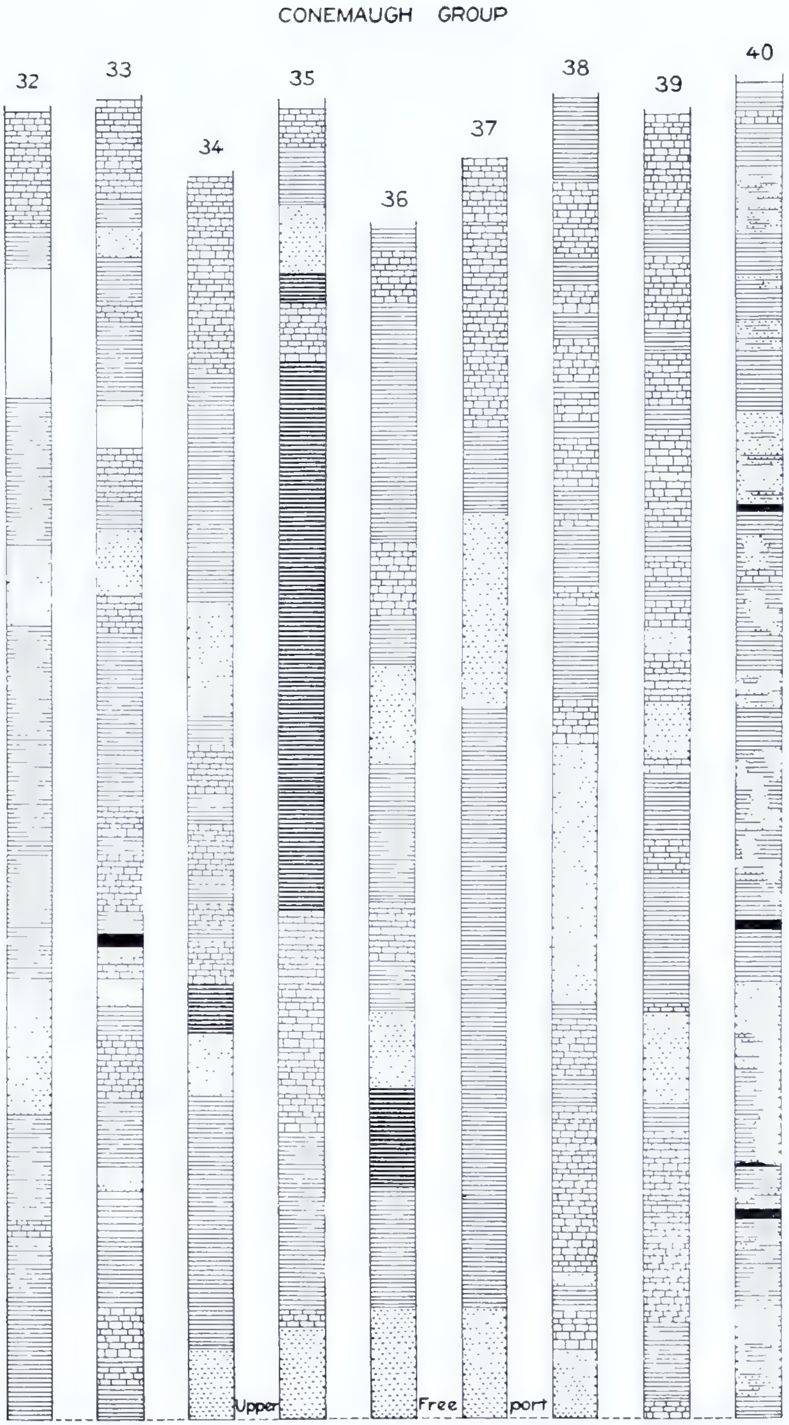


Figure 131. Stratigraphic sections cont'd. Washington County.

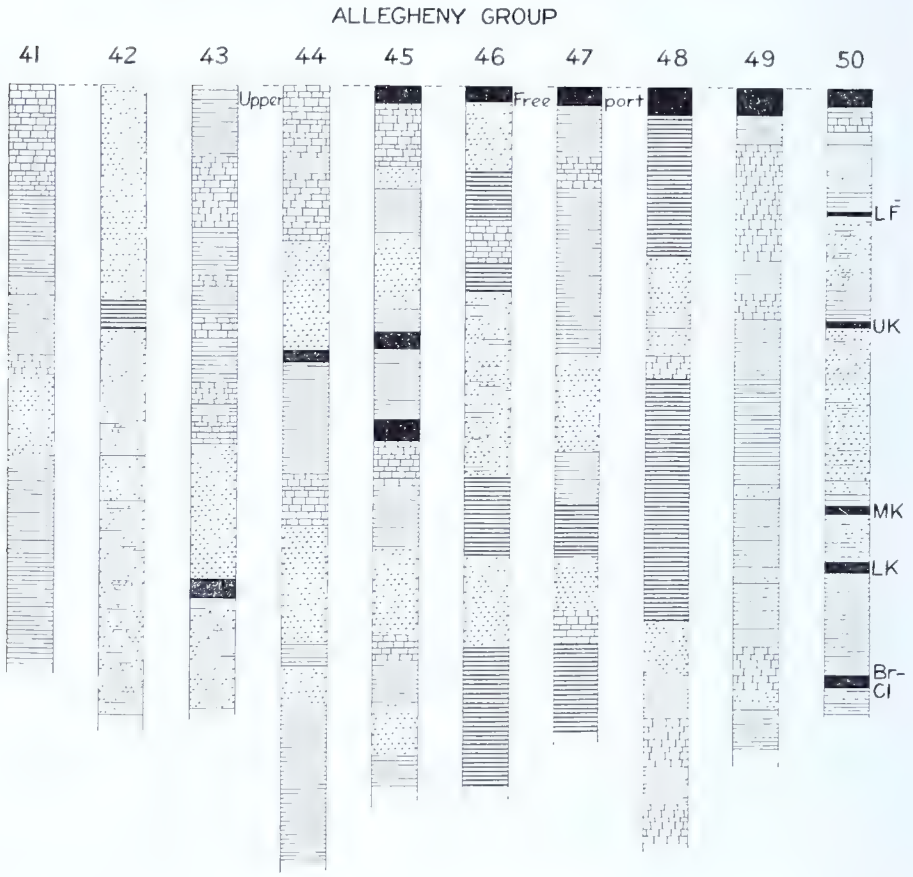


Figure 132. Stratigraphic sections cont'd. Washington County.

20. Monongahela group, 1 mile northwest of Deemston. U. S. G. S. Amity Folio.
21. Monongahela group, 1¼ miles northwest of Deemston. U. S. G. S. Amity Folio.
22. Monongahela group, 1¼ miles northeast of Zollarsville. U. S. G. S. Amity Folio.
23. Monongahela group, generalized section. U. S. G. S. Brownsville-Connellsville Folio.
24. Conemaugh group, generalized section. U. S. G. S. Burgettstown-Carnegie Folio.
25. Conemaugh group, on Robinson Run. U. S. G. S. Claysville Folio.
26. Conemaugh group, on Chartiers Creek. U. S. G. S. Claysville Folio.
27. Conemaugh group, 1½ miles south-southeast of Crothers. U. S. G. S. Claysville Folio.
28. Conemaugh group, 1½ miles southeast of Middletown. U. S. G. S. Claysville Folio.
29. Conemaugh group, Boro of Washington. U. S. G. S. Amity Folio.
30. Conemaugh group, ¾ mile east of Munntown. U. S. G. S. Amity Folio.
31. Conemaugh group, ½ mile north of Beallsville. U. S. G. S. Amity Folio.
32. Conemaugh group, West Pike Run township. U. S. G. S. Amity Folio.
33. Conemaugh group, ½ mile southwest of Beallsville. U. S. G. S. Amity Folio.
34. Conemaugh group, 1¼ miles northwest of Deemston. U. S. G. S. Amity Folio.
35. Conemaugh group, 1 mile northwest of Deemston. U. S. G. S. Amity Folio.
36. Conemaugh group, 1¼ miles northwest of Deemston. U. S. G. S. Amity Folio.
37. Conemaugh group, 1¼ miles northeast of Zollarsville. U. S. G. S. Amity Folio.
38. Conemaugh group, 1 mile northeast of Zollarsville. U. S. G. S. Amity Folio.
39. Conemaugh group, ¾ mile east of Zollarsville. U. S. G. S. Amity Folio.
40. Conemaugh group, generalized section. U. S. G. S. Brownsville-Connellsville Folio.

Allegheny group, on Robinson Run. U. S. G. S. Claysville Quadrangle.
42. Allegheny group, Borough of Washington. U. S. G. S. Amity Folio
43. Allegheny group, ¾ mile east of Munntown. U. S. G. S. Amity Folio.
44. Allegheny group, ½ mile north of Beallsville. U. S. G. S. Amity Folio.
45. Allegheny group, West Pike Run township. U. S. G. S. Amity Folio.

46. Allegheny group, 1 mile northwest of Deemston. U. S. G. S. Amity Folio.
47. Allegheny group, 1¼ miles northwest of Deemston. U. S. G. S. Amity Folio.
48. Allegheny group, 1¼ miles northeast of Zollarsville. U. S. G. S. Amity Folio.
49. Allegheny group, ¾ mile east of Zollarsville. U. S. G. S. Amity Folio.
50. Allegheny group, generalized section. U. S. G. S. Brownsville-Connellsville Folio.

COALS.

The coals of the Allegheny group in Washington County are far below the surface and do not outcrop. Information concerning them is based entirely on data obtained from drill records. These data are limited and inadequate since most of them are from churn drill records that do not give sections of the coals, and drillers, who are primarily concerned with oil and gas horizons, often fail to record coals.

Two coals of workable thickness have been found by drilling, one at the approximate horizon of the Freeport, and the other at the horizon of the Kittanning group of coals. This Survey has little information as to their thickness and persistence. Large companies, who have bought up considerable acreages in the county, are holding these coals as a reserve for future use. This is quite possible, for a locality containing the Allegheny group usually has at least one valuable coal, and may have several. Again, these coals are important in adjoining areas, and it is unlikely that all of them would thin and become unminable within a few miles.

This bed lies just below the Ames limestone in the Conemaugh group. It outcrops in the extreme northwest part of the county, and is 18 inches thick. It is geologically the lowest coal outcropping in the county.

A local bed lying 15 to 30 feet above the Ames limestone, is 3 feet thick near Murdocksville, and has been opened in several places.

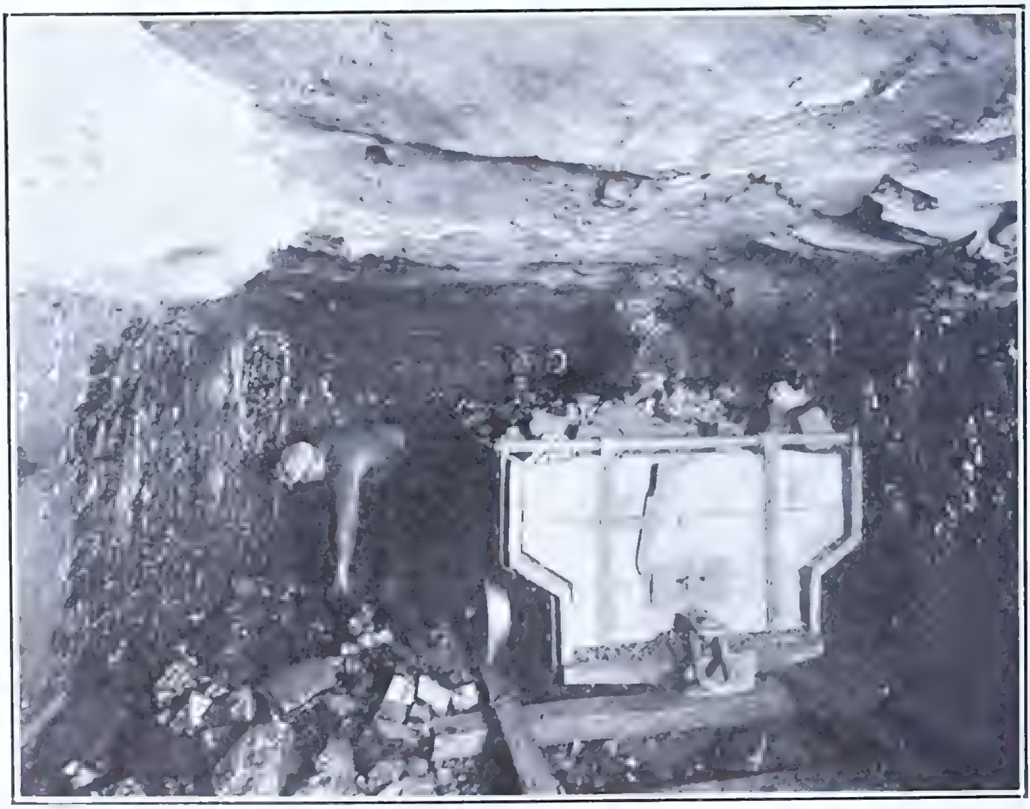
This bed is locally minable in the northwest part of the county, where it is known as the Bavington coal, because of its exceptional thickness at that town. In a small area southwest of Frankfort it is also thick enough for mining. The coal is dirty and very lenticular.

Pittsburgh Coal.

This bed is the best known, most valuable, and most persistent bed in Washington County. It has a total thickness, including clay and shale partings, of 4 to 9 feet, averaging about 5 feet. It is divided into four or five benches by clay or shale partings. Where the thickness is greatest, the bed carries many partings. In much of the area, a rider bed, having a thickness of 6 inches to 7 feet, occurs above the main bed. The main bed is 4 to 7 feet of good clean coal. Along Monongahela River the Pittsburgh bed is a coking coal; between the river and the Pigeon Creek districts it is a good gas coal. West of this gas coal belt it is a fine steam coal.

PLATE XIII.

A. Blocky nature of Pittsburgh coal in Washington County.



B. Pittsburgh coal bed in a Washington County mine.

The Pittsburgh coal underlies nearly all the county, and is lacking only in a small area in the northwest part, and in a few stream bottoms. The outcrop is limited almost entirely to Hanover, Smith, and Robinson townships in the northwest, and the townships bordering on the Monongahela. In these townships mining is by drift and slope; in the rest of the county, where the coal is several hundred feet below the surface, mining is by shaft. The bed is double almost everywhere, the roof and lower division being separated by a clay or shale parting, varying from a few inches to several feet thick.

The roof division is seldom clean enough to mine. It varies in thickness, and carries many partings in addition to several inches of bituminous shale at the top. This division usually consists of two benches, separated by clay; locally this clay thins and many alternating layers of shale and impure coal take its place.

In the river district the lower division of the bed is 4 to 9 feet thick, divided by three persistent bone partings into four benches, namely, the breast, the bearing-in, the brick, and the lower bottom coal. In the remainder of the county, particularly the western part, the small parting between the brick and the lower bottom coal is absent. A few inches of draw slate overlies the breast coal.

The breast coal is the most regular and valuable bench of the lower division.

The bearing-in coal is thin and soft, and slacks when mined. It is often discarded.

The brick coal has good quality, averages over 12 inches thick, and mines out in brick-shaped blocks.

The lower bottom coal, where not a distinct bench, is mined with the brick coal. The lower bottom coal is inclined to be dirty, and rather high in ash and sulphur.

Hanover township. The Pittsburgh coal outcrops in the high points on the watershed of Aunt Clara Fork of Kings Creek, Brush Run, and the northern tributaries of Harmon Creek. The bed is mined entirely by drift. The mines are generally small and locally the cover is very thin.

The Pittsburgh bed occurs in two divisions. The top division consists of 2 feet of roof coal underlain by draw slate 6 to 14 inches thick. This coal is not mined. In some localities it is excellent coal but usually rather high in ash and sulphur. In some mines a maximum of 9 feet of coal and shale separates the roof coal from the main bed. The main roof is a massive blue sandstone. The lower division of the bed varies somewhat in physical character but not in total thickness. The average thickness is 5 feet 3 inches.

In the eastern part of the township, principally along Raccoon Creek, the main bed is separated into three benches by bone coal partings. The top bench is 18 inches thick, separated from a middle bench, 1 foot 8 inches thick, by 1½ inches of bone. The middle bench is separated from the bottom bench, 18 inches thick, by 2 inches of bone coal. In the southern part of the township, between Kings and Harmon creeks, the bed occurs in a massive bench usually 4 feet 8 inches thick not including bone coal, 4 to 6 inches thick, directly below the draw slate. The bottom is fire clay and shale.

Robinson township. The northern outcrop of the Pittsburgh coal in Washington County crosses the northern end of Robinson township. The coal has been eroded from that point south to Candor with the exception of small isolated areas still remaining on the watersheds. The bed underlies the remainder of the township south of Candor.

The main bed has been practically worked out north of Candor, but between Candor and Midway are some large mines working this coal by shaft and slope 40 to 60 feet deep.

Between Candor and Midway the Pittsburgh ranges from 4 to 5 feet thick. A "rooster" coal, 3 feet thick, is separated from the main bed by roof coal and shale ranging from 12 inches to 6 feet thick, and a draw slate ranging from 1 to 6 inches thick.

The top bench of the main bed ranges from 2 feet 10 inches to 3 feet thick. The bearing-in bench is always present and ranges from 3 to 10 inches thick. It is separated from the top and bottom bench by bone partings usually not more than ¼ inch thick. The bottom bench ranges from 12 inches to 2 feet 2 inches thick. Locally a few inches of coal at the bottom is rather impure and is not mined.

Smith township. This township is in the midst of the large mines in the Pittsburgh bed on the Panhandle Division of the Pennsylvania Railroad in Washington County. The coal is mined by drift along the Pennsylvania Railroad, but south of Burgettstown, where the coal is deep under cover, it is mined by shafts, one of which is 275 feet deep. In the vicinity of Cherry Valley the coal is mined by shafts and slopes 40 to 75 feet deep. Practically the entire township is underlain by Pittsburgh coal.

The lower division of the Pittsburgh bed is very regular in thickness, averaging 5 feet 2 inches.

In the vicinity of Burgettstown a "rooster" coal is present ranging from 2 to 4 feet thick. It is not mined. It is separated from the main bench by 4 to 6 feet of roof coal and shale, and draw slate which ranges from 10 to 14 inches thick. A local bench of coal, 1 to 9 inches thick, occurs directly beneath the draw slate and is separated from the top bench of the main bed by a shale parting ¼ inch thick. The breast coal of the main bench ranges from 2 feet 10 inches to 3 feet 4 inches thick. The usual bearing-in bench is present 3 to 4½ inches thick, and is separated from the top and bottom benches by a bone coal parting ¼ to 1 inch thick. The bottom coal ranges from

1 foot 7 inches to 3 feet 2 inches thick. The same physical characters are present in the bed north of Burgettstown with the exception of a local tendency for the upper bench to be split by a bone parting 1½ inches thick, 18 inches from the top. The bearing-in bench is locally absent, the two binders having consolidated into one, ranging from 1 to 2 inches thick.

In the vicinity of Raccoon the main bed averages 5 feet 2 inches thick. The top bench, or breast coal, ranges from 2 feet 6 inches to 3 feet 2 inches thick but is separated into an upper and lower breast coal by a shale parting 1½ to 2½ inches thick. The usual bearing-in bench is present, 2 inches thick, separated from the upper and bottom benches by bone partings ¼ inch thick. The lower bench ranges from 12 to 18 inches thick.

In the vicinity of Cherry Valley the coal is 5 feet thick and has the usual characteristics of the Pittsburgh bed in this township. The top bench ranges from 1 foot 8 inches to 2 feet 6 inches thick. The bearing-in bench is 4 to 6 inches thick and is separated from the top and bottom benches by bone coal partings ¼ inch thick. The lower bench ranges from 1 foot 10 inches to 2 feet 2 inches thick.

In the vicinity of Bulger the coal is 5 feet thick and is regular with the exception of occasional clay veins. A roof coal, 12 inches thick, is usually present directly above the draw slate which ranges from 10 to 12 inches thick. The upper bench, or breast coal, ranges from 2 feet 6 inches to 4 feet 4 inches thick. It contains a bone coal parting 1 to 2 inches thick, 12 inches to 2 feet below the top. The mining bands are present above and below the bearing-in bench which is usually 3 to 4 inches thick. The bottom bench ranges from 16 inches to 2 feet 2 inches thick.

Jefferson township. The Pittsburgh coal underlies practically all of Jefferson township. It is mined by drift along Harmon Creek and in the vicinity of Eldersville in the northern part of the township and along Cross Creek in the southern part. The coal averages 5 feet 10 inches thick and is very regular in physical and chemical character.

On Harmon Creek the main bench has 2 to 5 inches of bony coal at the top. The breast coal is entirely lacking in some localities, the whole bed being a solid bench 4 feet 8 inches thick. In the vicinity of Eldersville the top bench is 2 feet 10 inches thick and the bottom 1 foot 8 inches thick. The bearing-in bench is 3 inches thick, separated by two ¼ inch partings. The bed is regular in thickness with the exception of certain localities where it is disturbed by rolls on the top and bottom. In the southern part of Jefferson township, along Cross Creek, the breast coal is usually about 3 feet 7 inches thick, the bearing-in bench 2 inches thick, and the bottom bench 9 to 12 inches thick. An occasional sandstone fault is driven through in mining.

Cross Creek township. The outcrop of the Pittsburgh coal is limited to a small area on Cross Creek west of Avella. In the remainder of the township the coal is deep under cover. The coal is mined by drifts, shafts, and slopes. All the mines are in the vicinity of Avella and Patterson Mill on Cross Creek and its northern fork. The coal averages 4 feet 10 inches thick. Draw slate is invariably present at the top of the bed. Above this draw slate is usually several feet of a shale and bone coal mixture including a "rooster" coal which is locally 3 feet thick. The top bench of the main bed ranges from 2 feet 5 inches to 4 feet thick. The bearing-in bench is 2½ to 4 inches thick. The bearing-in partings are ¼ to ½ inch thick. The bottom bench ranges from 16 inches to 2 feet 1 inch thick.

Independence township. The Pittsburgh coal has the same physical and chemical character in Independence township as it has in Cross Creek township. Only six commercial mines were working this coal in 1924. The outcrop of the Pittsburgh coal is limited to the valley of Cross Creek in the northern part of the township.

Southwest townships. In Donegal, Hopewell, Blaine, Canton, North and South Franklin, Buffalo, West Finley, East Finley, and Morris townships, the Pittsburgh coal ranges from 150 to 600 feet under the surface and is being mined at only two places in all these townships. Very little information can be published on the physical and chemical character of these coals. Numerous drill hole records indicate that the Pittsburgh bed is workable practically everywhere throughout all these townships. It thins locally and it is believed that the percentage of ash and sulphur is rather high in certain localities. After the more easily accessible Pittsburgh coal in Washington County has been worked out it will be worked by shaft in the southern and western parts of the county.

In a shaft 440 feet deep at Vienna 2½ miles west of Claysville in Donegal township the coal is 4 feet 9 inches thick. The coal has the same physical and chemical character as it displays in other openings 10 and 12 miles distant. The breast coal is 2 feet 1 inch thick; the bearing-in bench is 3 inches thick and has partings ½ inch thick above and below it. The bottom coal ranges from 1 foot 10 inches to 2 feet 2 inches thick.

In another shaft 460 feet deep ½ mile southeast of Sugar Hill and 2 miles southwest of Washington the coal averages 5 feet 6 inches thick. The coal is regular in thickness and the chemical character is excellent. The bed has 18 inches of draw slate above it. The breast coal is 2 feet 10 inches thick. The bearing-in bench is 3 inches thick with ½ inch bone partings above and below. The bottom coal is 1 foot 10 inches thick with an impure bench of coal 6 to 8 inches thick beneath it. The bottom is limestone.

Mt. Pleasant township. The outcrop of the Pittsburgh bed in this township is limited to the valley of Robinson Run, where it is mined by drift. The mines in the remainder of the township are shaft and slope. The bed ranges from 5 feet to 6 feet 4 inches thick, averaging 5 feet 6 inches. The bed has no irregularities of deposition with the exception of a few clay veins which are locally present near the bottom of the bed. Without exception the bed occurs in three benches, the upper or breast coal, the middle or bearing-in coal, and the lower or bottom coal. The breast coal ranges from 2 feet 10 inches to 3 feet 3 inches thick. The bearing-in bench ranges from 3 to 4½ inches thick. The bottom coal ranges from 2 feet to 2 feet 4 inches thick.

The bed is mined in the vicinity of Primrose where it is 5 feet 1 inch thick. It is overlain by 1 to 3 feet of roof coal and shale, and from 2 to 5½ inches of draw slate. The breast coal is 3 feet thick. The bearing-in bench is 3 inches thick and separated from the top and bottom benches by ¼ inch partings. The bottom coal is 2 feet thick. The bottom is clay.

Practically the same physical and chemical character is displayed where it is mined on Miller Run 1½ miles northwest of Venice on the Wabash Division of the Pennsylvania Railroad.

The coal is not being mined in the central and western parts of the township. A very important mining center is at Westland on Westland Run in the southeastern part of the township. At this locality the coal averages 6 feet thick. It is regular with the exception of clay veins in the bottom. The bed is overlain by the usual draw slate which is usually 12 inches thick. The breast coal ranges from 2 feet 11 inches to 3 feet 8 inches thick. The bearing-in bench is usually less than 3 inches thick and is separated from the upper and lower benches by the bearing-in partings which are ¼ to ½ inch thick. The bottom bench ranges from 2 feet 2 inches to 2 feet 9 inches thick.

Cecil township. The Pittsburgh coal can be mined by drift in this township only on Robinson Run in the vicinity of McDonald. The remainder of the mines in this bed are shaft and range from 150 to 310 feet deep.

The bed ranges from 5 feet 5 inches to 6 feet 6 inches, averaging about 5 feet 7 inches. Deposition has been regular with the exception of a few clay veins in the bottom of the bed, a few horsebacks in the roof, and one sandstone replacement 400 feet wide just west of Morganza.

In the northern part of the township the Pittsburgh bed averages 5 feet 2 inches thick. It is overlain by 1 to 3 feet of roof coal and shale, and a draw slate averaging 3 inches thick. The top bench, or breast coal, is 3 feet thick, the bearing-in bench is 2 inches thick, and the bottom bench is 2 feet thick. The bottom is clay.

The coal is mined in the vicinity of Venice on Millers Run in the central part of the township. It averages 5 feet 5 inches thick and is clean with the exception of the usual bearing-in partings and a few streaks of blackjack just above them. The breast coal ranges from 2 feet 4 inches to 3 feet thick. The bearing-in bench is 3 inches thick with ¼ inch binders above and below. The bottom coal is 2 feet 6 inches thick.

On McPherson Creek the coal is mined by shafts 260 to 310 feet deep. The coal is perfectly regular and averages 5 feet 4 inches thick. The draw slate above the bed is 6 inches thick. The breast coal is 3 feet thick, the bearing-in bench 3 inches thick. and the bottom bench 2 feet 4 inches thick. The bottom is limestone.

On Chartiers Creek in the northeastern part of the township the Pittsburgh coal is 5 feet 6 inches thick and contains some clay veins and horsebacks in the roof. The draw slate is usually thin, averaging less than 5 inches. The breast coal averages 3 feet thick, the bearing-in bench 3 inches thick, and the bottom coal 2 feet 2 inches thick. This bottom bench is often designated as two benches because the lower 12 inches of the coal is somewhat inferior to the upper part of the bench.

The Pittsburgh bed was being mined in 1924 at three points on the Chartiers Branch of Chartiers Creek and its tributaries. The coal averages 5 feet 6 inches thick. The draw slate above the bed is 12 inches thick. The breast coal averages 2 feet 7 inches thick. The bearing-in bench is 3 inches thick with bone partings ½ inch thick above and below. The bottom bench is usually 2 feet thick. The bottom is limestone.

Peters township. The Pittsburgh bed is under cover everywhere in Peters township with the exception of a small area on Peters Creek in the vicinity of Anderson and Hackett. In 1924 there was only one mine working the Pittsburgh bed in Peters township with the exception of those along Peters Creek.

In the northern part of this township the Pittsburgh coal averages 5 feet 6 inches thick. It appears to be perfectly regular with the exception of a few clay veins and horsebacks or pots in the roof. The usual draw slate is present above the breast coal and is 2 to 5 inches thick. The breast coal is 3 feet thick, the bearing-in bench 3 inches thick and is separated from the upper and lower benches by bone partings from ¼ to ¾ inch thick. The bottom bench is usually 2 feet 2 inches thick. Twelve inches of coal at the bottom is slightly inferior and is known as the lower bottom coal.

In the southern part of the township the coal averages 5 feet 8 inches thick. Clay veins are invariably present in this part of the township but are usually limited to the lower part of the bed. Bone spars at the bottom of the lower bench make the coal so high in ash that it can not be marketed and it is left in the mines. A roof coal, 10 inches thick, directly above a draw slate 10 inches thick, is usually present in this part of the township. The breast coal ranges from 2 feet 9 inches to 4 feet thick. Twin bands ¼ inch thick, separated by 4 inches of coal, are present below the breast coal. The bottom coal ranges from 1 foot 8 inches to 2 feet 4 inches thick. The bottom is fire clay.

Chartiers township. The Pittsburgh coal is under cover throughout the entire township with the exception of its outcrop along Chartiers Creek and a short distance up its northwestern tributaries between Canonsburg and Meadow Lands. The bed is remarkably free from irregularities of deposition. It ranges from 5 feet to 5 feet 8 inches thick, averaging 5 feet 5 inches. Without exception the bed occurs in three benches, the top or breast coal, the middle or bearing-in coal, and the bottom coal. In the vicinity of Canonsburg the coal is 5 feet 8 inches thick and is overlain by draw slate 1 inch to 2 feet thick. The breast coal ranges from 2 feet 7 inches to 3 feet 4 inches thick. The bearing-in bench is 3 inches thick, and the bearing-in partings are each ½ inch thick. The bottom coal is 2 feet 2 inches thick. Locally 3 inches of bony coal is present above a limestone bottom.

The coal is being mined by drift on Plum Run where it is 5 feet 3 inches thick. The draw slate is 12 inches thick, the breast coal 2 feet 10 inches thick; the bearing-in bench is 3 inches thick separated from the top and bottom benches by bone partings ½ inch thick. The bottom coal is 2 feet 2 inches thick. The bottom is limestone.

The Pittsburgh coal is easily accessible by drift in the valley of Cherry Run. The bed ranges from 5 feet 4 inches to 5 feet 8 inches thick. There are no irregularities in the physical character of the coal. The breast coal ranges from 2 feet 8 inches to 3 feet 3 inches. The bearing-in bench is 3 inches thick and is separated from the top bench by a bone parting ¼ inch thick, and from the bottom bench by a similar parting ½ to ¾ inch thick. The bottom is limestone.

The bed is mined by drift on Chartiers Creek and its small western tributaries south of Houston. It ranges from 5 feet to 5 feet 5 inches thick not including a roof coal which is locally 2 feet 6 inches thick. The draw slate ranges from 6 to 10 inches thick. The breast coal is very regular in thickness, averaging approximately 2 feet 11 inches. The bearing-in bench is 3 inches thick and the adjoining partings are ½ inch thick. The bottom coal ranges from 1 foot 7 inches to 2 feet 2 inches thick. The bottom is limestone.

The Pittsburgh coal is mined by shafts and slopes between Meadow Lands and Washington. The coal deepens southward from Meadow Lands until at Tylerdale it is 277 feet below the surface. The coal ranges from 5 feet 4 inches to 6 feet 4 inches thick. The greatest thickness is at Arden Mines. The coal is very regular with the exception of occasional clay veins which do not exceed 8 inches thick. The bed has from 2 to 9 inches of slate and coal over it. The breast coal ranges from 2 feet 8 inches to 3 feet 3 inches thick. The bearing-in bench is 1½ to 3 inches thick with bone partings above and below it ¼ to ½ inch thick. The bottom coal ranges from 2 feet to 2 feet 3 inches thick. The bottom is limestone.

North and South Strabane townships. The Pittsburgh coal is deep under cover in these two townships with the exception of a small area along Chartiers Creek between Meadow Lands and Houston. In the vicinity of Canonsburg the coal is 5 feet 8 inches thick. The bed has from 1 inch to 2 feet of draw slate above it. The breast coal ranges from 3 feet 5 inches to 3 feet 11 inches thick. The bearing-in bench is 2 inches thick, separated from the top and bottom coal by shale partings ranging from ½ to 2 inches thick. The bottom coal ranges from 2 feet 2 inches to 2 feet 8 inches thick.

A few drill hole records in these two townships indicate that the Pittsburgh coal varies little in physical and chemical character. It will undoubtedly be mined extensively in the future by shaft and driven into from the crop on Chartiers Creek. It is being mined by slope 1 mile northeast of McGovern station where it is 5 feet thick not including a roof coal ranging from 1 foot 8 inches to 2 feet thick. The draw slate above the breast coal is 7 to 10 inches thick. The breast coal is 2 feet 11 inches thick. The bearing-in bench is 3 feet thick with bone partings above and below it ½ inch thick. The bottom bench ranges from 1 foot 7 inches to 2 feet thick. A group of mines east of Enterprise is mining the Pittsburgh by shafts 210 to 230 feet deep. The coal is very similar to that at McGovern.

Amwell township. The Pittsburgh coal is from 40 to 625 feet deep in Amwell township. It is not being mined, but diamond drill hole records and churn drill records from oil and gas drilling indicate that it averages approximately 5 feet thick. It appears to have the same physical and chemical character as in West Bethlehem township.

Union township. The Pittsburgh coal has an extensive outcrop in Union township along Peters Creek and Monongahela River and their tributaries. The bed is exceptionally free from any irregularities of deposition. Occasional clay veins cut the bed. These are usually less than 2 feet thick. The Pittsburgh bed ranges from 4 feet 8 inches to 5 feet 6 inches thick, averaging 5 feet 4 inches.

In the northwest corner of Union township the bed is 4 feet 8 inches thick and has a persistent draw slate 12 inches thick above it. A local "rooster" coal ranges from 1 foot 8 inches to 2 feet 2 inches thick. The breast coal ranges from 3 feet 3 inches to 3 feet 6 inches thick. The bearing-in coal is 4 inches thick with a binder above it $\frac{3}{8}$ inch thick, and one below $\frac{1}{2}$ inch thick. The bottom coal is usually 2 feet 6 inches thick. Seventeen inches at the base of this bench is inferior and is often left in the mines. The bottom is fire clay.

On Peters Creek, in the vicinity of Finleyville and Gastonville, the Pittsburgh coal is being mined by drift and is 5 feet 6 inches thick. The bed is very regular with the exception of local clay veins and spars in the bottom of the bed. The usual draw slate 6 to 10 inches thick is present above the top bench. The top bench ranges from 2 feet 7 inches to 3 feet thick. The bearing-in bench is 3 inches thick with $\frac{1}{2}$ inch bone partings above and below it. The bottom bench ranges from 2 feet 4 inches to 2 feet 6 inches thick. It is rather high in sulphur and ash. The bottom is fire clay and limestone.

Numerous large mines are working this coal by drift on the western bluff of Monongahela River. Some of these mines are very old and will eventually drive in for several miles. Opposite Elrama the Pittsburgh coal is 5 feet 6 inches. The draw slate is 10 inches thick. The top bench is 3 feet thick and is separated from the lower bench by the bearing-in coal 3 inches thick with $\frac{1}{4}$ inch parting above and below it. The bottom bench is 2 feet 3 inches thick. From Shire Oaks south to River View the coal is uniformly 5 feet 5 inches thick. The draw slate is 10 to 12 inches thick. The breast coal ranges from 2 feet 6 inches to 3 feet thick. The bearing-in coal ranges from 2 to 3 inches thick, and the partings above and below it are each $\frac{1}{2}$ inch thick. The bottom coal ranges from 2 feet 3 inches to 2 feet 7 inches thick. Locally a few inches at the bottom is high in ash and sulphur. Occasional clay veins cut the lower part of the bed.

Nottingham township. The Pittsburgh bed outcrops only along Peters Creek in the vicinity of Anderson in Nottingham township. It is approximately 600 feet deep in the southwest corner of the township. The coal ranges from 5 feet 4 inches to 6 feet 6 inches. It is very regular in thickness and the only irregularities are local clay veins near the bottom.

In the northern part of the township the bed is mined by drifts, shafts, and slopes. It averages 5 feet 8 inches thick. The top bench is overlain by 5 to 12 inches of draw slate. The breast coal is 2 feet 9 inches to 4 feet thick. The bearing-in bench is 4 inches thick including two $\frac{1}{2}$ inch bone partings. The bottom bench ranges from 1 foot 6 inches to 2 feet 4 inches thick. The bottom is clay.

Very few publishable data are available concerning the coal in southern Nottingham township. The coal probably averages 5 feet 6 inches thick, and in general has the same physical and chemical character as it has in adjoining townships.

Carroll township. The Pittsburgh coal has an extensive outcrop in Carroll township along Monongahela River, Mingo and Pigeon creeks. The coal is mined by drifts, shafts, and slopes. The coal varies little from 5 feet 6 inches thick. In the northern part of the township, along Mingo Creek and Monongahela River, the coal is uniformly 5 feet 6 inches thick and has 12 inches of draw slate above it. The top bench ranges from 3 feet 6 inches to 3 feet 11 inches thick. It is soft and mines out in fair sized lumps. It has a few sulphur nodules scattered through it. The bearing-in bench is 2 inches thick with two ½ inch bone partings above and below it. The bottom coal is 2 feet 3 inches to 2 feet 11 inches thick and is good soft coal. The bottom is limestone.

The Pittsburgh coal is being mined extensively on Pigeon Creek, where it averages 5 feet 9 inches thick. The bed is generally very uniform. Clay veins are numerous locally and a few rolls and swamps are encountered. The bed is overlain by fire clay 9 inches thick, which is used at several localities for making brick. The top coal is medium hard and mines out in fair sized lumps. It ranges from 2 feet 10 inches to 4 feet thick. The bearing-in bench is 3 inches thick with bone partings ranging from ½ to ⅝ inch thick. The bottom coal is usually about 27 inches thick. The lower 12 inches of this bench locally contains sulphur streaks and is left down in mining. Along Monongahela River, between Monongahela and Donora, the bed averages 5 feet 6 inches thick, and has practically the same physical character as on Pigeon Creek. South of Donora the bed thickens to an average of 6 feet. The bed is overlain by 5 to 12 inches of draw slate. The breast coal is medium hard and averages 3 feet 4 inches thick. The bearing-in bench is 2½ to 3½ inches thick, with a top parting of ¼ inch and a bottom one ½ inch thick. The bottom coal averages 2 feet 4 inches thick. The bottom is hard clay.

Fallowfield township. The Pittsburgh coal has an extensive outcrop on Monongahela River and Maple Creek. The mines are drifts, shafts, and slopes. The coal ranges from 5 feet 10 inches to 6 feet 2 inches thick. There is only a slight variation in thickness, and the bed is generally constant in physical character. Occasional rolls, swamps, and clay veins are met with in mining. The bed occurs persistently in three benches.

On Pigeon Creek, where it is being mined by shafts and slopes, the coal has a maximum depth of 210 feet. In this area the draw slate is constantly 12 inches thick. The breast coal ranges from 2 feet 11 inches to 4 feet thick. It mines out in good sized lumps, and the only impurities are sulphur nodules. The bearing-in coal is 1 to 2 inches thick, with partings ranging from ½ to ⅜ inch thick above and below it. The bottom coal ranges from 2 feet 4 inches to 3 feet 6 inches thick. At the base of the bed is 3 or 4 inches of impure coal which is not mined.

In the vicinity of Pigeon Creek town there is a local exception to the regular physical character of the bed. The bearing-in bench is not present, but two partings 1 inch thick and 22 inches apart occur near the center of the bed. The bottom is limestone and fire clay.

From the northern township line south to Maple Creek the coal averages 5 feet 10 inches thick, occasionally having an excessive thickness of 6 feet 4 inches. Occasional rock rolls on the roof, and a few clay veins, are the only irregularities. The usual 12 inches of draw slate is present at the top of the bed. The breast coal ranges from 3 feet to 3 feet 5 inches thick, and bearing-in coal from 1½ to 3 inches thick. The parting above it is usually ¼ inch thick, and the one below ½ inch thick. The bottom coal ranges from 1 foot 8 inches to 2 feet 8 inches thick. Some mines have 4 inches of inferior coal above the clay bottom.

From Maple Creek to the southern township line the bed averages 6 feet thick. There are no irregularities in deposition. Twelve inches of impure roof coal are invariably present above a 12 inch draw slate. The breast coal ranges from 2 feet 9 inches to 4 feet thick. The breast coal ranges from 2 feet 9 inches to 4 feet thick. The bearing-in bench ranges from 2 to 4 inches thick with ½ inch bone partings above and below. The bottom bench is hard coal ranging from 1 foot 6 inches to 2 feet 5 inches thick. Locally 12 inches at the bottom of this bench is streaked with bone and pyrite spars and is left down.

Somerset township and Bentleyville boro. The Pittsburgh coal does not outcrop in Somerset township. The only mines in this bed are on South Pigeon Creek at Bentleyville and Ellsworth. In this vicinity the Pittsburgh coal ranges from 6 feet 3 inches to 6 feet 6 inches thick. In Bentleyville boro the bed is overlain by 12 inches of draw slate. The breast coal is 3 feet 2 inches thick. The bearing-in bench is 2 inches thick with ½ inch bone partings above and below. The bottom coal is 2 feet 6 inches thick. From 2 to 3 inches of coal at the bottom of the lower bench is left in place because it contains bone and sulphur nodules.

In the vicinity of Ellsworth the physical character of the Pittsburgh bed has changed. Thin shale and bone partings have appeared in the entire bed. They are most prevalent in the lower 20 inches.

Drilling in the central and northern part of Somerset township indicates that the coal averages approximately 6 feet thick. In the northern part of the township it resembles the Pittsburgh coal in adjoining townships, and is composed of the usual three benches. In the central portion several thin binders, usually less than $\frac{1}{4}$ inch thick, have made their appearance.

West Bethlehem township. The Pittsburgh coal does not outcrop in this township. It is mined at Three and Four in the northeastern part of the township, and at Marianna in the southern part of the township.

At Three and Four the Pittsburgh coal is mined by shaft 395 to 430 feet deep. A roof coal, 16 inches thick, separated from the top by 3 inches of shale, is not mined. Between this roof coal and the main bench is 9 to 15 inches of shale. In some parts of these mines the bed occurs in three benches. The upper bench is 2 feet 6 inches to 3 feet 1 inch thick. The bearing-in bench is usually 2 inches thick with shale partings above and below $\frac{1}{4}$ inch thick. The bottom bench averages 2 feet 6 inches thick. In other parts of these mines the upper bench is separated into two minor benches by a shale parting $\frac{1}{2}$ inch thick near the center of the main bench. The lower bench also contains five shale partings which average $\frac{1}{8}$ inch thick. The bottom is fire clay.

In the southern part of the township, in the vicinity of Marianna, the entire bed averages 6 feet thick. It is overlain by draw slate 11 to 14 inches thick. The breast coal ranges from 3 feet to 3 feet 3 inches thick. The bearing-in bench is usually bone $\frac{3}{4}$ inches thick, with an upper and a lower parting each $\frac{1}{2}$ inch thick. The bottom coal is 2 feet 9 inches thick. Approximately 4 inches of this bottom coal is so impure that it is left in the mines.

Drilling for oil and gas in the western part of Bethlehem township gives the impression that the Pittsburgh coal is of good thickness there. There are no definite data for publication.

Allen township. This area lies in the bend of the Monongahela between Charleroi and California. The Pittsburgh coal outcrops on the west slope of the Monongahela the entire distance. The coal has been mined at numerous points along its outcrop. In the northern part of this area the coal ranges from 6 feet 6 inches to 6 feet 11 inches thick. In the southern part it averages 6 feet 2 inches thick.

In Twilight, Speers, and Dunlevy boroughs the coal is 6 feet 11 inches thick including a roof coal 12 inches thick. The main bed is overlain by a draw slate 12 inches thick. The top bench is clean, hard coal, which mines out in large lumps. It has an average thickness of 4 feet 8 inches. The bearing-in bench is 2 inches thick, separated from the top and bottom benches by 2 bone partings $\frac{1}{2}$ inch thick. The bottom coal is 2 feet thick, and is hard and clean. The bottom is fire clay.

In Long Branch borough and Allen township the coal averages 6 feet 6 inches thick. The roof coal, usually 12 inches thick, is separated from the main bench by 12 inches of hard clay. The top bench is 4 feet 6 inches thick. The coal is clean and breaks up into large cubical blocks with very little fine coal. The bearing-in bench is 2 inches thick with the usual partings above and below it. The lower bench is 2 feet 6 inches thick not including 2 inches of sulphur and bone at the bottom.

In Stockdale, Roscoe, and Elco boroughs the coal averages 6 feet 3 inches thick not including the "rooster" coal. The breast coal is 3 feet 6 inches thick, and is separated from the bearing-in bench, usually 1½ inches thick, by a bone parting ⅜ inch thick. The bottom bench ranges from 2 feet 5 inches to 2 feet 9 inches thick, and is separated from the bearing-in bench by a shale parting ⅝ inch thick. The lower bench contains two types of coal. Fourteen to 17 inches of the bottom coal is rather impure.

East and West Pike Run townships. The Pittsburgh coal outcrops along Monongahela River and on Pike and Gorby runs. It is mined by drifts and slopes on Monongahela River. The mines are driven westward.

The coal ranges from 6 feet 2 inches to 7 feet 8 inches thick. In general there are very few irregularities in the bed. North of Gorby Run the bed is overlain by 6 to 12 inches of draw slate. The breast coal is 3 feet 6 inches thick. The bearing-in coal is 1½ inches thick, separated from the top bench by a bone parting ⅜ inch thick, and from the bottom bench by a similar parting ⅝ inch thick. The bottom bench totals 2 feet 8 inches thick. A few inches at the bottom is impure and not mined.

In the vicinity of California the breast coal ranges from 3 feet 2 inches to 4 feet thick. The bearing-in bench is 3 to 4 inches thick, separated from the top and bottom benches by ¼ inch bone partings. The bottom bench ranges from 2 feet 8 inches to 3 feet 2 inches thick. In this vicinity some of the mines are bothered by rolls on the bottom, and frequently clay veins separate the bed.

In the southeastern corner of East Pike Run township the Pittsburgh bed is 7 feet 6 inches thick. The breast coal is a hard cubical coal averaging 4 feet thick. The bearing-in bench is 3 inches thick and has the usual bone partings above and below it. The bottom bench is 3 feet 2 inches thick, practically all of which is excellent coal.

The Pittsburgh bed has not been mined in West Pike Run township, where it is deep under cover. Mines on the river and at Ellsworth will probably drive into it. The coal is probably of good thickness and quality throughout the entire township.

Centerville borough. The Pittsburgh coal outcrops along the river in this borough. It ranges from 5 feet 10 inches to 7 feet 8 inches thick. Occasional rolls on the bottom and thin clay veins are the only irregularities in the bed. In the northern part of the borough the bed averages approximately 7 feet thick. The top bench is 4 feet thick, and is separated from the bottom bench by a 1-inch bone parting. The bottom coal is 3 feet thick with 3 inches of impure coal underlying it. In the vicinity of Lock No. 5 the Pittsburgh coal ranges from 7 feet 4 inches to 8 feet thick. It is uniform in thickness, and a few clay veins and rolls on the bottom are present as is characteristic of the Pittsburgh coal in southeastern Washington County. The top bench, or breast coal, is 3 feet 4 inches to 4 feet thick. In almost all localities it is clean, but locally thin binders of sulphur, usually five in number, are present. In these localities the top bench is unusually thick. The bearing-in bench is usually 3 inches thick, with shale partings, $\frac{1}{4}$ inch thick, above and below. The bottom bench ranges from 2 feet 7 inches to 3 feet 2 inches thick. In southern Centerville borough the Pittsburgh coal ranges from 5 feet 4 inches to 8 feet 4 inches thick. The breast coal is persistently 4 feet thick. The bearing-in bench is 3 to 4 inches thick, with $\frac{1}{4}$ inch bone partings above and below. The bottom bench is 3 feet to 3 feet 8 inches thick.

The greatest thickness of the Pittsburgh coal in Washington County is in the bend of the river $1\frac{1}{2}$ miles southeast of Riverville.

East Bethlehem township. The Pittsburgh coal has an extensive outcrop along Monongahela River and Tenmile Creek. Practically all of the mines are drift.

The coal ranges from 5 feet 8 inches to 7 feet thick, The top bench ranges from 3 to 4 feet thick. The bearing-in bench is 4 inches thick with a $\frac{1}{4}$ inch bone parting above and below. The bottom bench ranges from 2 feet 10 inches to 3 feet 5 inches thick. The bottom is fire clay. Locally the bed is cut out by pinches and rock faults. Clay veins are also numerous locally.

Deemston borough. The Pittsburgh bed does not outcrop in this borough, nor is it opened. Little information is available for publication concerning the thickness and chemical character of the coal in this borough. It is believed, however, that the usual thickness and good chemical character of the bed will be continuous here.

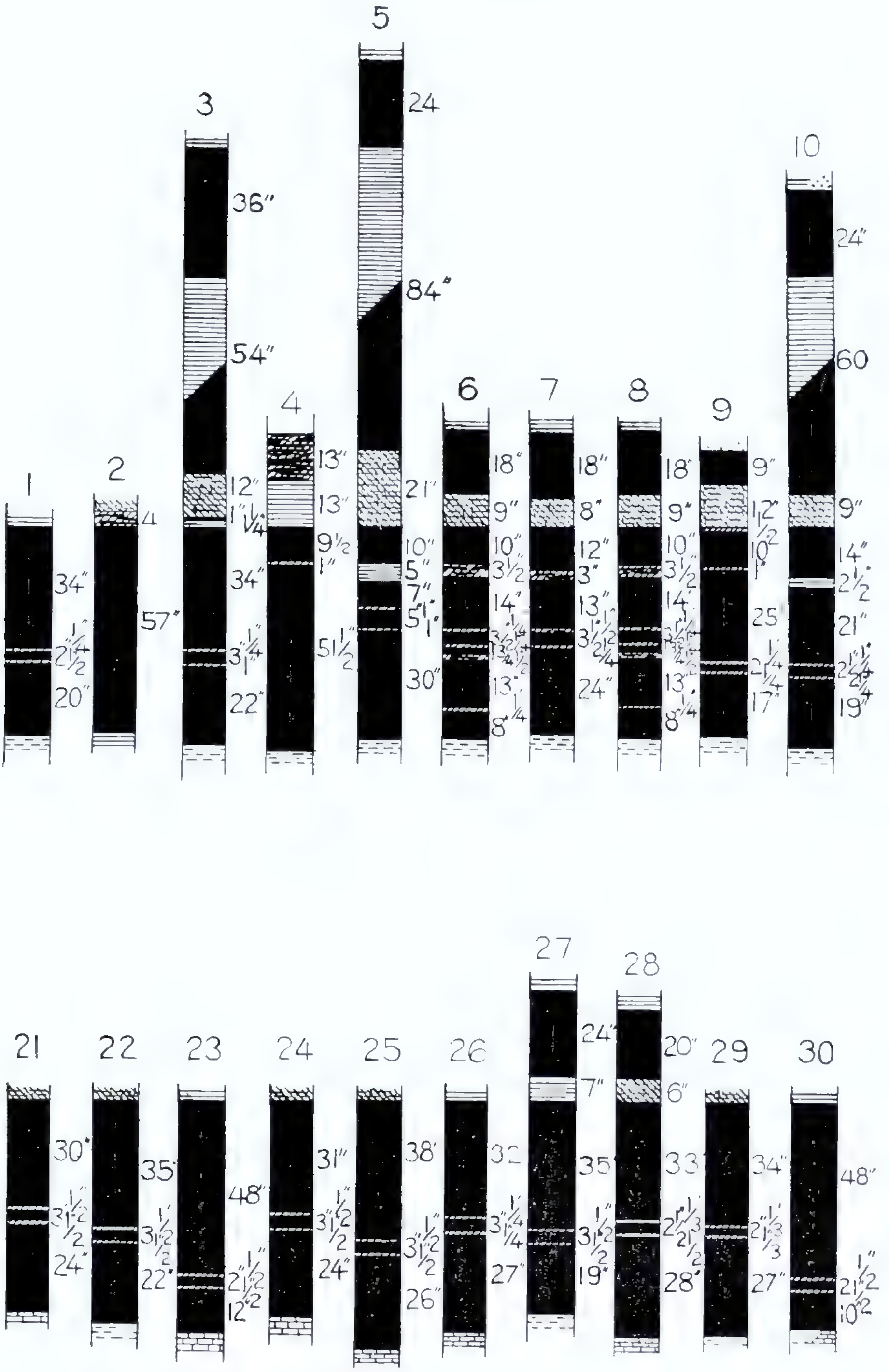


Figure 133. Sections of Pittsburgh coal in Washington County.

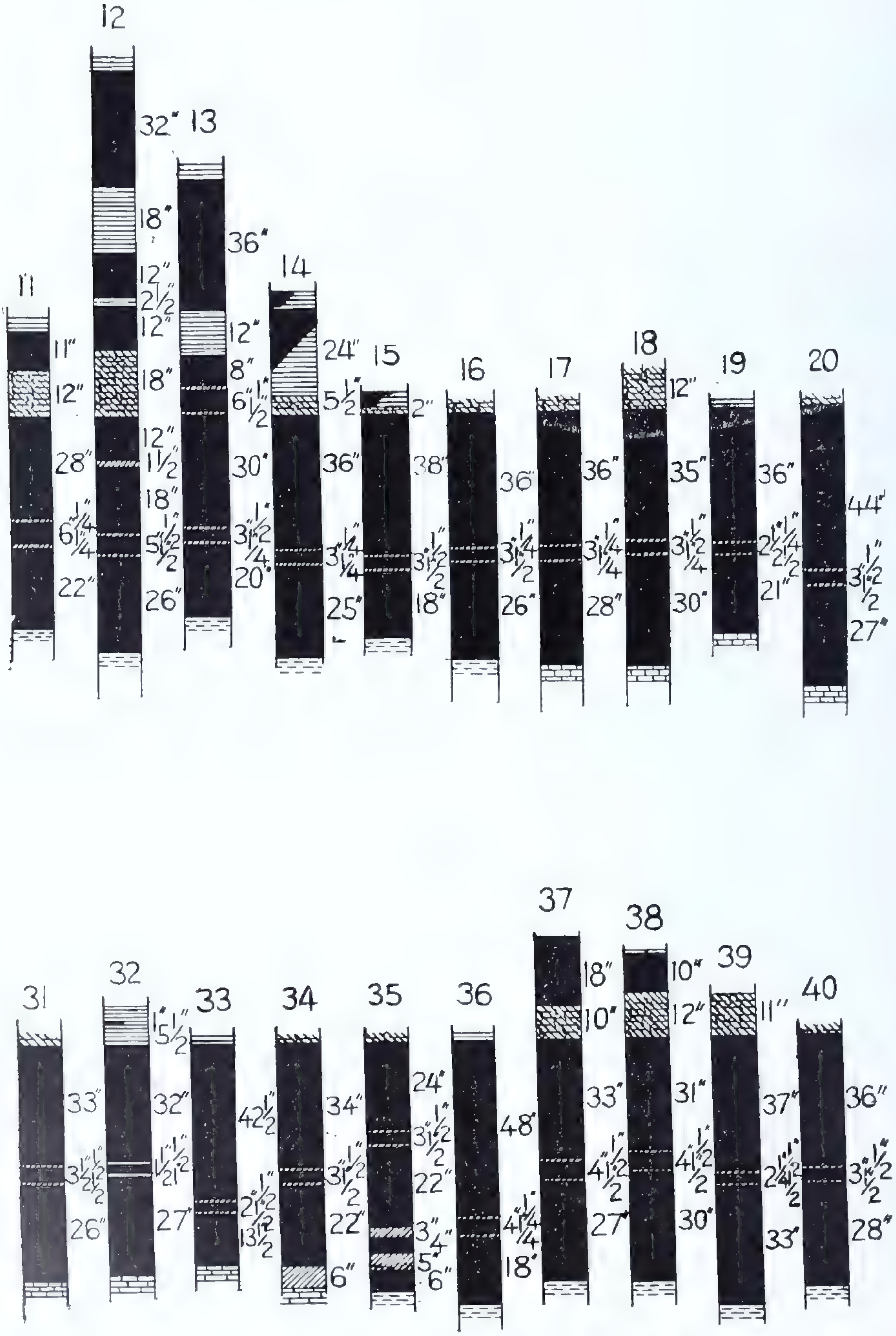


Figure 134. Sections of Pittsburgh coal in Washington County.

1. Superior Mining Company. Superior mine, ¼ mile northeast of Eldersville, Jefferson township.
2. Bertha Consumers Coal Company. Bertha mine, ¼ mile southwest of Dinsmore, Jefferson township.
3. Carnegie Coal Company. Atlas mine, at Atlasburg, Smith township.
4. Greensburg Connellsville Coal & Coke Company. Francis mine, 1 mile west of Burgettstown, Smith township.
5. Carnegie Coal Company. Louise mine, ¾ mile northeast of Burgettstown, Smith township.

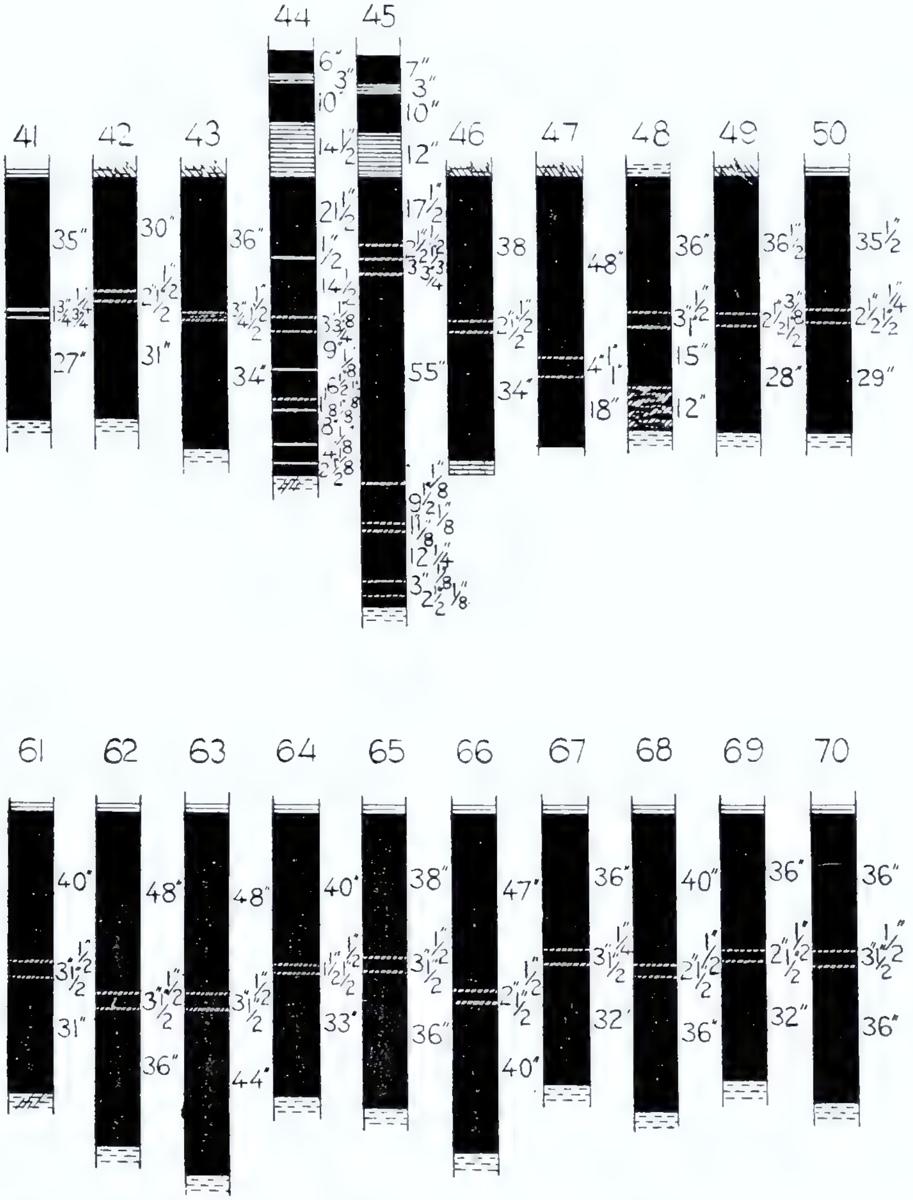


Figure 135. Sections of Pittsburgh coal in Washington County.

6. Harmon Creek Coal Company. Fulton mine, ¾ mile north of Burgettstown, Smith township.
7. Harmon Creek Coal Company. Florence mine, 1½ miles north of Burgettstown, Smith township.
8. Harmon Creek Coal Company. (Stripping), 1¼ miles northeast of Burgettstown, near Bavington, Smith township.
9. W. H. Shimm Coal Company. Marie mine, 1¾ miles east of Burgettstown, Smith township.
10. Carnegie Coal Company. Armide No. 1 mine, ½ mile south of Raccoon, Smith township.
11. Pittsburgh & Eastern Coal Company. Pittsburgh & Eastern No. 1 mine, at Cherry Valley, Smith township.
12. Bulger Block Coal Company. Bulger mine, at Bulger, Smith township.
13. Doudet Bros. Coal Company. Doudet mine, ½ mile northwest of Midway, Robinson township.

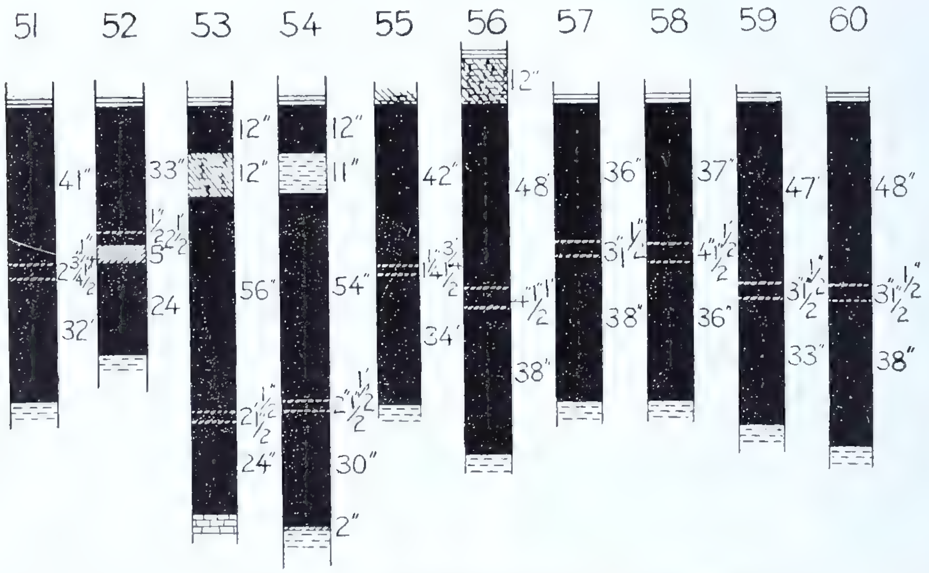


Figure 136. Sections of Pittsburgh coal in Washington County.

14. Carnegie Coal Company. Primrose mine, at Primrose, Mount Pleasant township.
15. Carnegie Coal Company. McDonald mine, 1 mile east of Primrose, Robinson township.
16. Pittsburgh Coal Company. Montour No. 4 mine, at Lawrence Post Office, Peters township.
17. Henderson Coal Company. Henderson No. 1 mine, 2 miles southeast of Bishop, Cecil township.
18. Gilmore Coal Mining Company. Morris mine, at Venice, Cecil township.
19. Pittsburgh Coal Company. Montour No. 1 mine, 2 miles west of Venice, Mount Pleasant township.
20. Westland Coal Company. Dhans mine, ½ mile northwest of Westland, Mount Pleasant township.
21. Pittsburgh & Southwestern Coal Company. Pittsburgh & Southwestern No. 1 mine, ½ mile east of Avella, Cross Creek township.
22. Duquesne Coal & Coke Company. Aurora mine, ¾ mile northwest of Avella, Independence township.
23. Carnegie Coal Company. Cedar Grove mine, 2 miles north of Avella, Cross Creek township.
24. Canonsburg Gas Coal Company. Davis mine, at Canonsburg, Cecil township.
25. W. A. Banfield. Coal Hollow mine, between Canonsburg and Huston, Chartiers township.
26. Export Coal Company. Beech Hill mine, 4 miles west of Houston, near Menden, Chartiers township.
27. Lindley Coal Company. Lindley mine, 1 mile southeast of Huston, North Strabane township.
28. Pittsburgh Coal Company. Allison mine, 1½ miles southwest of Huston, Chartiers township.
29. McClain Mining Company. Rich Hill No. 1 mine, ½ mile west of Meadowlands, Chartiers township.
30. Youghiogheny & Ohio Coal Company. Manifold No. 1 mine, near Enterprise, South Strabane township.
31. Country Club Coal Company. Sutton mine, 1 mile southeast of McClane Station, South Strabane township.
32. Meadow Lands Coal Company. Meadow Lands No. 2 mine, near Arden Mines, Chartiers township.
33. Washington Gas Coal Company. Tyler mine, at Tyler, Washington Boro.
34. Lincoln Gas Coal Company. Lincoln No. 1 mine (shaft 460 feet), 2¾ miles southwest of Washington, Buffalo township.
35. Producers Corp. Masten Shaft (440 ft.), 2½ miles southwest of Claysville, Donegal township.
36. Eclipse Gas Coal Company. Eclipse mine, 1 mile west of Venetia, Nottingham township.
37. Anderson-Rees Coal Producers. Anderson mine, at Anderson, Peters township.

38. Henderson Coal Company. Henderson No. 2 mine, ½ mile northeast of Finleyville, Union township.
39. Pittsburgh Coal Company. Coal Bluff mine, 1 mile southwest of Shire Oaks, Union township.
40. Pittsburgh Coal Company. Cincinnati mine, ½ mile south of Houston, Union township.
41. National Mining Company. National No. 4 mine, ¼ mile south of Courtney, Union township.
42. J. K. and W. S. Cochrane. Mingo mine, near Jones Stop, on Mingo Creek, 4 miles west of Monongahela, Union township.
43. Bethlehem Mines Corporation. No. 58 mine, Marianna Boro, West Bethlehem township.
44. Bethlehem Mines Corporation. No. 53 mine, at Three and Four, West Bethlehem township.
45. Bethlehem Mines Corporation. No. 52 mine, at Ellsworth, Somerset township.
46. Union Coal & Coke Company. Acme mine, ½ mile south of Weaver Station, Bentleyville Boro.
47. Valley Camp Coal Company. Soudan mine, at Van Voorhis, Fallowfield township.
48. P. V. K. Coal Company. Home No. 2 mine, at Frye Station, Carroll township.
49. Pittsburgh Coal Company. Catsburg mine, ¾ mile southeast of Monongahela at Riverview, Carroll township.
50. Clipper Coal Company. Clipper mine, ¼ mile north of Lock No. 4, Fallowfield township.
51. J. W. Latchem. Williard mine, on 11th St., Charleroi.
52. Sloan Coal Company. Sloan mine, at Rider Stop, 1¼ miles southwest of Charleroi, Fallowfield township.
53. Warner-Youghiogheny Coal Company. Maxwell mine, ¼ mile south of Charleroi, Fallowfield township.
54. Vesta Coal Company. Vesta No. 1 mine, ¾ mile northwest of Allenport, Allen township.
55. Pittsburgh Coal Company. Eclipse mine, 1¼ miles west of Roscoe, at Elco, East Pike Run township.
56. Bradford Gas Coal Company. Bradford mine, ¼ mile north of Coal Center, East Pike Run township.
57. Clifton Coal Company. Clifton mine, 2½ miles southwest of Coal Center on West Pike Run, East Pike Run township.
58. Vesta Coal Company. Mine No. 4, at California.
59. Pittsburgh Coal Company. Crescent mine, 1 mile south of California, East Pike Run township.
60. Lilley Coal & Coke Company. Lilley mine, ¾ mile north of West Brownsville Station, East Pike Run township.
61. Diamond Coal & Coke Company. Diamond mine, 1 mile south of West Brownsville Station, Centerville Boro.
62. Reliance Coke & Furnace Company. Reliance No. 1 mine, at Denbo, Centerville Boro.
63. Fifth Pool Coal Company. Dawson mine, ½ mile south of Denbo Station, Centerville Boro.
64. Maple Glen Coal Works. Driftwood mine, at Driftwood Station, Centerville Boro.
65. Maple Glen Coal Works. Maple Glen mine, at Maple Glen Station, East Bethlehem township.
66. Vesta Coal Company. Mine No. 5, 1 mile north of Fredericktown Station.
67. Edwina Coal Company. Edwina mine, ¼ mile south of Fredericktown, East Bethlehem township.
68. Millsboro Coal & Coke Company. Millsboro mine, at Millsboro, East Bethlehem township.
69. Lacey Coal Company. Virginia mine, 1 mile southwest of Millsboro, East Bethlehem township.
70. Champion Gas Coal Company. Champion mine, at Besco, East Bethlehem township.

Redstone Coal.

In the northern part of Washington County the Redstone coal lies from 60 to 70 feet above the Pittsburgh. It has practically no commercial value, and is usually less than 2 feet thick. Even where thick enough to be mined it has been broken up by mining the Pittsburgh beneath it, and the thinness of the bed will prevent mining because of additional costs.

In the central part of Washington County the Redstone coal is usually very thin. Locally it is 3 to 5 feet thick, but is much parted by shale and bone, and the coal is high in ash. It may be of minable quality in local areas.

It is most promising in the vicinity of Hackett and Finleyville, where it has been opened at numerous country banks. It ranges from 2 feet to 3 feet 6 inches thick, and occurs in a single bench with local bone coal benches above and below. In this locality the Redstone is next in importance to the Pittsburgh.

The Redstone coal lies from 40 to 80 feet above the Pittsburgh in eastern Washington County. It is generally a persistent bed and one of the most promising above the Pittsburgh. Probably its greatest thickness and best quality are in Carroll township, where it is often 4 feet thick and has excellent quality. It is also exposed near the mouth of Tenmile Creek, but appears to have thinned and averages less than 2 feet thick.

In Scotts Hollow, on Pigeon Creek, it has been mined in two benches 18 and 21 inches thick. Above Lock No. 4, on the Monongahela, the coal is often 4 feet thick, and has excellent quality. On the Monongahela in Carroll township, its thickness is 2 to 3½ feet; near the mouth of Mingo Creek the bed has a regular thickness of 4 feet.

There are no analyses of the Redstone worthy of publication, but it will undoubtedly have some commercial value in the vicinity of Hackett and Finleyville, and in Carroll township of eastern Washington County.

In the southern and western parts of the county, where it is deep under cover, little is known of its thickness and chemical character, but some areas may be found wherein it is minable.

SEWICKLEY COAL.

The Sewickley coal, lying 100 to 130 feet above the Pittsburgh coal, is only locally minable in Washington County. It has a maximum thickness of 2 feet 4 inches of clean coal on Mingo Creek.

UNIONTOWN COAL.

The Uniontown coal, lying about 225 feet above the Pittsburgh coal, is not of commercial importance at present, and the minable coal is rarely more than 20 inches thick.

WAYNESBURG COAL.

The Waynesburg coal is between 290 and 350 feet above the Pittsburgh bed. It is a valuable domestic supply in regions where the Pittsburgh bed does not outcrop, although its quality is not as good.

The Waynesburg coal commonly is divided into three benches by thick clay partings. Usually the middle bench is mined, the top bench being dirty, and the lower bench generally too thin. The top bench ranges from 3 inches to 2 feet thick; a 12 to 18 inch clay parting separates it from a middle bench ranging from a few inches to 3 feet thick. The lower bench is commonly 15 to 30 inches thick, with a maximum of 4 feet 4 inches. It is separated from the middle bench by a few inches of clay. The Waynesburg bed is a hard block coal of no coking value; its ash ranges from 10 to 20 per cent, and its sulphur from 2 to 5 per cent.

Northern townships. The Waynesburg coal has been eroded in the northwestern part of Washington County, including all of Hanover, Robinson, and the northern part of Jefferson and Smith townships.

The Waynesburg coal seems to be either too thin or impure to be worked in most of Smith township. On Raccoon Creek several exposures show it to be only a few inches thick. An outcrop on Burgetts Fork of Raccoon Creek has a total thickness of 4 feet 6 inches. The bed contains two thick clay partings, and the coal numerous lenses of bone. A bony coal bench is also present at the bottom of the bed. South of Dinsmore the coal is of workable thickness at one locality where the entire bed averages 3 feet 11 inches thick including a bony coal bench 8 inches thick at the bottom.

In northeastern Jefferson township the Waynesburg coal outcrops and shows a total thickness of 5 feet 2 inches, of which 3 feet is clean coal. Two clay and shale partings, aggregating 2 feet 6 inches thick, destroy the possible commercial value of this bed. Numerous other outcrops east of Eldersville indicate that the coal is of value only for local fuel in Jefferson township.

The Waynesburg bed has an extensive outcrop on the headwaters of North, South, and Middle Forks of Cross Creek in Cross Creek township. Numerous country banks have worked this coal for domestic fuel but no large mines have been opened. On the North Fork of Cross Creek the entire bed is slightly over 2 feet thick. It is separated into two benches by a bone coal parting usually 2 inches thick. On the Middle Fork of Cross Creek the coal is thicker, averaging 4 feet 4 inches thick, including a clay parting near the center averaging 12 inches thick. On the South Fork of Cross Creek the coal has thickened to 4 feet, but is divided into three benches by clay partings, the upper averaging 8 inches thick, and the lower 2 inches thick. The lower bench of coal, which is 17 inches thick, is also rather impure. In the vicinity of Woodrow the Waynesburg bed is approximately 4 feet thick and is valuable as a source of local fuel. On Cross Creek proper the bed is greatly variable in thickness, and opening it is rather hazardous.

The Waynesburg is present in the southern and northern parts of Mount Pleasant township. Its outcrops are numerous, but few country banks have been opened in it. At Hickory the bed is 4 feet 6 inches thick including two clay partings, the upper 8 inches thick, and the lower 2 inches thick. On the Burgetts Fork of Raccoon Creek, north of Hickory, the coal is also of minable thickness. The clay partings have thinned, and a middle bench of coal, 16 inches thick, looks as if it might be excellent fuel.

The Waynesburg coal outcrops in Cecil township in the hills between Robinson and Miller runs, and between Miller Run and Chartiers Creek. A few openings have been made in this bed between Miller Run and Chartiers Creek. A typical section can be seen on McPherson Creek 2 miles west of Hills (Lawrence P. O). Here the bed is 2 feet 11 inches thick including two clay partings having a total thickness of 6 inches. The middle bench is 17 inches of clean coal. It is doubtful whether the Waynesburg will have much commercial importance in this township.

Peters township. The Waynesburg bed has an extensive outcrop in Peters township in the vicinity of Thompsonville, McMurry, and Bower Hill. Numerous outcrops can be seen in the roads. A typical one is 1½ miles southwest of Thompsonville, where the bed is 3 feet 4 inches thick including the two typical clay partings, the upper one 4 inches thick, and the lower 2 inches thick. The top bench of coal, 18 inches thick, appears to be very good. The middle and lower benches, which are thinner, are somewhat dirty. In the eastern part of Peters township the entire bed ranges from 3 feet 2 inches to 5 feet thick. Where thickest the bed is much parted by clay and bone coal. At Bower Hill the bed is 3 feet 7 inches thick including a clay and bone coal parting in the middle 18 inches thick. Only a few areas of Waynesburg coal in Peters township will have future commercial importance.

Independence township. The Waynesburg bed has an extensive outcrop in Independence township. The bed is usually separated into two benches by a clay or shale parting 6 to 12 inches thick. The top bench ranges from 10 to 18 inches thick, and is locally bony. The bottom bench is the best coal and ranges from 9 to 14 inches thick. Locally the bed is only a few inches thick, and in a short distance increases to 5 or 6 feet. On Sugarcamp Run the entire bed is 2 feet 6 inches thick including 6 inches of shale in the middle. On Buffalo Creek the bed ranges from 2 feet 4 inches to 3 feet 6 inches thick.

The Waynesburg underlies practically all of Hopewell township. It outcrops on Brush Run and its tributaries, and on Cross Creek. The bed varies greatly in physical and chemical character. Usually it occurs as three or four benches of varying thickness, separated by shale partings. The coal has been mined at many small country banks for local use. In the vicinity of Buffalo, and on the eastern part of Brush Run, the bed is 3 feet 5 inches thick including two shale partings, the upper 10 inches thick, and the lower ½ inch thick. The best coal is in the upper bench which is usually a few inches to 1 foot thick. On Dunkle Run, and the western part of Brush Run, the bed is much thicker, averaging 5 feet 4 inches thick. It usually occurs in four benches separated by shale partings 2 to 5 inches thick. A middle bench of fairly good coal is usually 3 feet thick. This bench alone is mined. In the northern part of Hopewell township the coal is usually contained in three benches separated by two shale partings rarely exceeding 4 inches thick. Locally the coal has excellent quality, but in general it is high in ash.

Blaine township. The Waynesburg coal underlies all of Blaine township, but outcrops only along Brush Run and Buffalo Creek. On Buffalo Creek, in the vicinity of Acheson, the coal occurs in one bench 4 feet 6 inches thick. One foot 8 inches at the top is bone. Eastward along Buffalo Creek the coal is 2 feet 7 inches thick, and clean. On Brush Run the bed is usually 6 feet thick including a shale and clay parting approximately 2 feet thick. The upper bench of coal is 5 inches thick, the bottom bench averages 3 feet 8 inches thick. Locally it has excellent quality, but is usually rather high in ash.

The Waynesburg coal outcrops on Georges Run, and in the vicinity of Wolftown in Canton township. On Georges Run the bed varies much in thickness and physical character. Usually it occurs in three benches separated by clay and bone coal partings. The middle bench is usually the thickest and best coal, but is rarely over 18 inches thick. The top and bottom benches range from 4 to 10 inches thick.

In the vicinity of Wolftown the bed averages 3 feet 4 inches thick. The top bench averages 7 inches thick and is separated from the middle bench by a bone coal parting 10 inches thick. The middle bench ranges from 10 inches to 1 foot 6 inches thick and is separated from a bottom bench, 5 inches thick, by a clay parting 3 inches thick. The Waynesburg coal is not being mined in Canton township except as a source of domestic fuel when other coal is not available.

The Waynesburg coal does not outcrop in the southwestern townships of Washington County. It has been noted at many localities by oil and gas drillers. In some localities it is entirely absent, in others its horizon is marked by many feet of bituminous shale. It is of workable thickness and quality in large areas and will probably be mined commercially in the future.

Strabane township. The Waynesburg bed outcrops on Big and Little Chartiers creeks in North and South Strabane townships. Outcrops indicate that the commercial value of the bed in these townships is doubtful except in local areas. Locally the bed is between 3 and 4 feet thick. It is never entirely clean, and is usually separated into two benches by a clay parting 6 to 10 inches thick. The top bench, ranging from 2 to 3 feet thick, is the best coal; the bottom bench, ranging from 4 to 10 inches thick, contains numerous spars of bone and sulphur.

The outcrop of the Waynesburg bed in Amwell township is limited to a small area in the vicinity of Lone Pine. Here the entire bed is 6 feet thick. It occurs in three benches. The top bench ranges from 12 to 14 inches, and is separated from the middle bench by a clay parting 10 to 14 inches thick. The middle bench is fairly good coal, 3 feet 2 inches thick. It is separated from the bottom bench, 6 to 8 inches thick, by a clay parting 5 inches thick.

West Bethlehem township. In West Bethlehem township the Waynesburg outcrops only on the South Branch of Pigeon Creek in the northern part of the township, and in the vicinity of Zollarsville in the southeastern corner. In the northern part of this township the Waynesburg bed is probably of minable thickness and quality, although much difficulty will be met with in separating the impurities from the coal. The bed is usually split into three or four benches by a shale and clay parting a few inches to over a foot thick. In the vicinity of Zollarsville the Waynesburg bed is 4 feet 10 inches thick including a clay parting, 10 inches thick, 13 inches below the top. The bottom bench, ranging from 2 feet 10 inches to 3 feet 4 inches thick, has minable quality but is locally high in ash because of bone and pyrite spars.

Somerset township. The Waynesburg coal has an extensive outcrop in Somerset township on the South Branch of Pigeon Creek and its northern tributaries. Country banks are numerous. In the vicinity of Three and Four the bed is 4 feet 7 inches thick including two clay partings aggregating 18 inches. The middle and bottom benches are the best coal. The bottom bench is 2 feet 4 inches thick, and the middle 16 inches thick. In the vicinity of Bentleyville the characteristic clay partings are present, but the bottom bench of coal is bony. The middle bench has thickened to 2 feet 8 inches and has fair quality. On the North Branch of Pigeon Creek the Waynesburg is 6 feet 4 inches thick including shale and clay partings aggregating 17 inches. The top bench is 12 to 16 inches thick, the middle bench is 2 feet 8 inches thick, and the bottom bench 14 inches thick. In the country banks mining this coal the top bench is left in place. The middle and bottom bench is mined, and a 3-inch parting of clay beneath them is picked out by hand.

Nottingham township. The Waynesburg coal outcrops on practically all the creeks in Nottingham township. On Sugar Run the bed is 6 feet 4 inches thick including 16 inches of clay partings. The top bench is 13 inches thick, separated from a middle bench, 3 feet thick, by 14 inches of clay. The middle bench is separated from a thin bottom bench by 2 inches of clay. The middle and bottom benches are mined but the top bench is left in place. On Peters Creek, in the vicinity of Anderson, the usual clay partings are present, but the middle bench has thickened to 3 feet 6 inches and is mined for local use, although it is rather high in ash and sulphur.

The Waynesburg bed is not considered important in Carroll township. It is present only on the divide between Mingo and Pigeon creeks, and between Pigeon Creek and Monongahela River. The coal is easily accessible by drift, and for that reason has been used for domestic fuel. Commercial mines may be opened in it in the future. The entire bed averages 6 feet 6 inches thick. It is split into two benches by clay partings, the upper one 5 inches thick, and the lower 7 inches thick. The middle and main bench of the bed is 3 feet 2 inches thick, the top bench 6 inches, and the bottom bench 10 inches.

The Waynesburg coal outcrops in the highlands east and west of Pigeon Creek in Nottingham township. Country banks have been opened in these hills and the coal was found to be approximately 6 feet 6 inches thick, including a top clay parting 14 inches thick and a bottom bone parting 2 inches thick. The top bench of coal is 12 inches thick, the middle bench 3 feet 2 inches, and the bottom 13 inches thick. The middle and bottom benches are mined but the coal above the top clay parting is generally left in place.

Pike Run township.—The Waynesburg coal outcrops east of Pigeon Creek in West Pike Run township. The coal averages 6 feet 3 inches thick, and is usually separated into four benches by three clay partings ranging from 1 to 12 inches thick. The coal can be mined if the clay partings are separated from the coal. The coal benches have the following thickness in descending order: 12 inches, 2 feet 4 inches, 3 inches, and 17 inches.

The Waynesburg outcrops on practically all the creeks in Deemston township. It has been mined at several places for local use. It generally occurs in two benches separated by a thin clay parting. The top bench is approximately 12 inches thick, and the bottom bench ranges from 2 feet 10 inches to 3 feet 4 inches thick. The coal has fairly good quality although the bed is very irregular in deposition.

The Waynesburg bed is of little importance between Charleroi and West Brownsville. It outcrops only in the highest hills and is used only for domestic fuel. During war time a few small mines were opened in East Pike Run township where the bed ranges from

2 feet 10 inches to 5 feet 6 inches thick. It occurs in three to five benches separated by clay partings ranging from 1 to 8 inches thick. These partings are hard to separate from the coal and greatly hinder its sale.

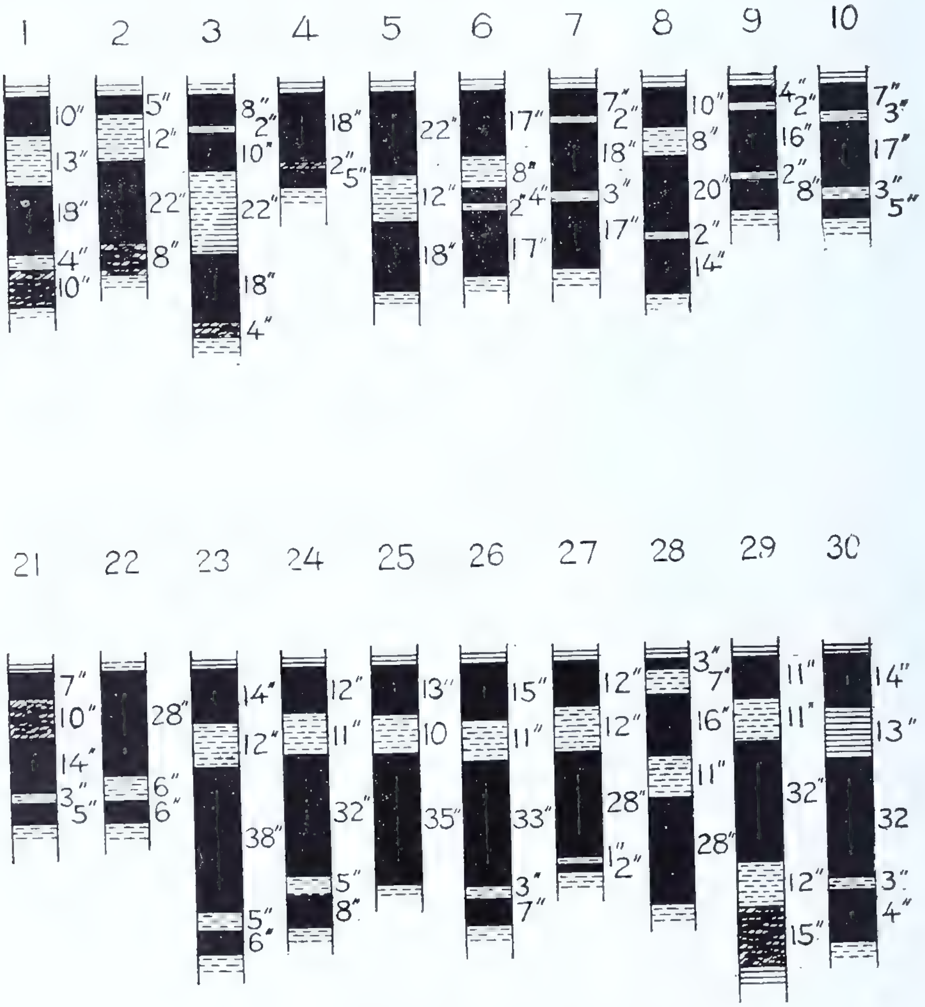


Figure 137. Sections of Waynesburg coal in Washington County.

1. Outcrop on Burgetts Fork of Raccoon Creek, 1½ miles southwest of Cherry Valley, Smith township.
2. Outcrop in road on Jefferson-Smith township line 1 mile south of Dinsmore, Smith township.
3. Outcrop at schoolhouse at cross roads 1¼ miles south of Hanlin Station, Jefferson township.
4. Outcrop on North Fork of Cross Creek ½ mile west of Cross Creek town, Cross Creek township.
5. Outcrop on Middle Fork of Cross Creek ½ mile east of Pattersons Mill, Cross Creek township.
6. Outcrop on South Fork of Cross Creek, 1¼ miles west of Woodrow, Cross Creek township.
7. Country bank, 1 mile northwest of Woodrow, Cross Creek township.
8. Outcrop at Hickory, Mount Pleasant township.
9. Outcrop on Burgetts Fork of Raccoon Creek, 1½ miles northwest of Hickory, Mount Pleasant township.

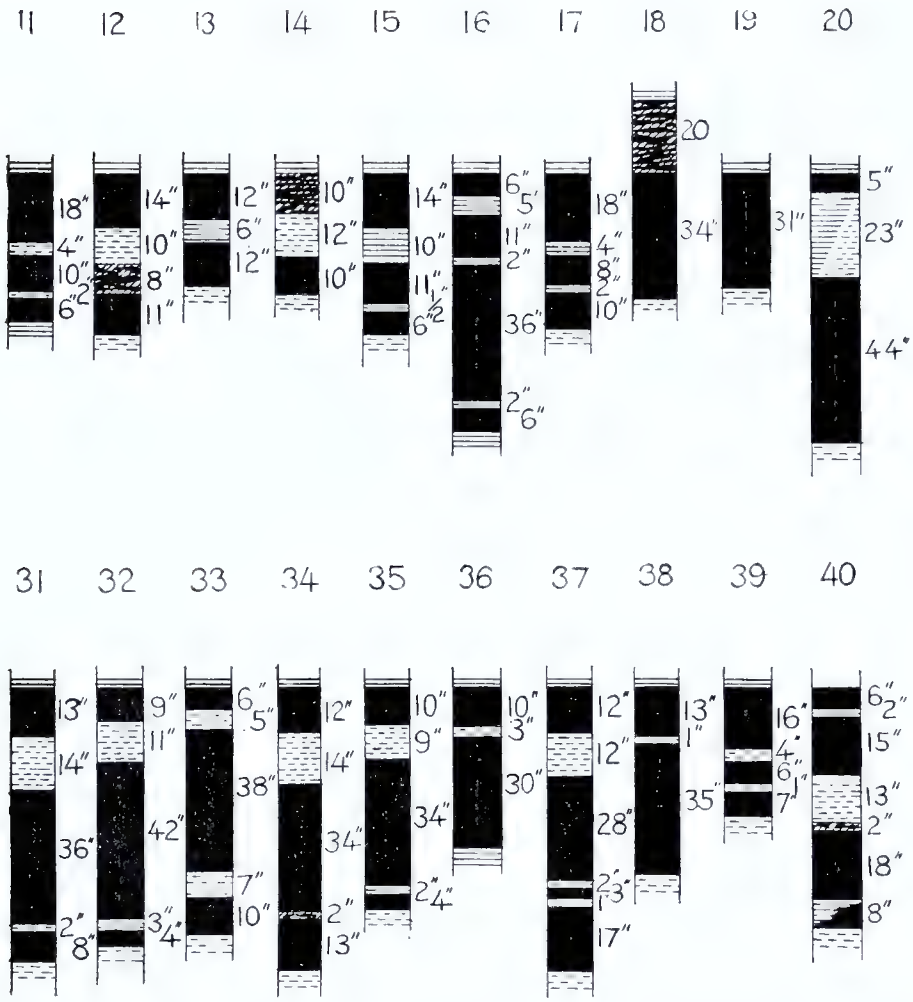


Figure 138. Sections of Waynesburg coal in Washington County.

10. Outcrop on McPherson Creek, 2 miles west of Hills (Lawrence P. O.), Cecil township.
11. Outcrop on road 1½ miles southwest of Thompsonville, near Little Chartiers Creek, Peters township.
12. Outcrop at Bower Hill, Peters township.
13. Outcrop on Sugar Camp Run, 1 mile south of Manchester Schoolhouse, Independence township.
14. Outcrop on Buffalo Creek, near Acheson, Independence township.
15. Outcrop on Brush Run, 1½ miles south of Buffalo, Hopewell township.
16. Outcrop on Brush Run, ½ mile east of Independence township line, Hopewell township.
17. Outcrop in road 2 miles northwest of Buffalo, Hopewell township.
18. Outcrop on Buffalo Creek 1¾ miles southeast of Acheson, Blaine township.
19. Outcrop, south slope of Buffalo Creek, ½ mile east of mouth of Polecat Hollow, Blaine township.
20. Country bank, east slope of Brush Run, 1 mile south of its mouth, Blaine township.
21. Outcrop in road 1½ miles west of Wolftown, Canton township.
22. Outcrop 1½ miles north of Thomas, North Strabane township.
23. Outcrop on Little Tenmile Creek, 1 mile north of Lone Pine, Amwell township.
24. Outcrop on Little Tenmile Creek, ¼ mile southeast of Lone Pine, Amwell township.
25. Outcrop on Tenmile Creek at Zollarsville, West Bethlehem township.
26. Outcrop on Brush Run at Lone Pine, West Bethlehem township.

27. Outcrop on South Branch of Pigeon Creek, 1 mile northwest of Three and Four, West Bethlehem township.
28. Outcrop on South Branch of Pigeon Creek, 1¾ miles northeast of Scenery Hill, Somerset township.
29. Outcrop on Center Branch of Pigeon Creek, ¾ mile northwest of Bentleyville, Somerset township.
30. Generalized section from six outcrops on North Branch of Pigeon Creek, Somerset township.
31. Outcrop on Mingo Creek, near Sugar Run, Nottingham township.
32. Outcrop on Peters Creek, ¼ mile south of Anderson, Nottingham township.
33. Outcrop on ridge ½ mile southwest of Hazzard, Carroll township.
34. Outcrop on South Fork of Sawmill Run, Fallowfield township.
35. Outcrop on Krepp Knob, 1 mile west of West Brownsville, East Pike Run township.
36. Country bank on head of Lillys Run, 1½ miles northwest of West Brownsville, East Pike Run township.
37. Country bank on Pike Run, 1¼ miles northeast of Beallsville, West Pike Run township.
38. Outcrop on Tenmile Run, near mouth of Plum Run, Deemston township.
39. Country bank, 1½ miles north of Denbo, East Bethlehem township.
40. Country bank, ½ mile north of Besco, East Bethlehem township.

WAYNESBURG "A" COAL.

This bed has been opened in a few places for domestic fuel. Its thickness in most places is less than 12 inches, although it is locally 3 feet 1 inch thick in the eastern part of the county. The coal is very dirty and is associated with many feet of bituminous shale.

LITTLE WASHINGTON COAL.

This bed is a hard block coal free from partings. Its thickness is rarely over 12 inches, and it is never minable.

WASHINGTON COAL.

The Washington coal is minable in many townships, but its value is greatly lessened by the presence of many clay partings. In the northwest part of the county it is between 4 and 8 feet thick, but is very impure. The upper part of the bed is several feet of alternating layers of clay and coal; the lower part is a bench of coal 2 to 3 feet thick. This bed is the most important outcropping coal in the western part of the county, where its average thickness is 5 feet 6 inches. The upper part of the bed is composed of alternating layers of coal and shale; the lower part is a good coal 2½ to 3 feet thick. The coal is not important in the eastern part of the county, although locally, the coal equals the Waynesburg in value as a domestic fuel.

The coals above the Washington bed are not thick enough for mining, and will not be described in this publication.

Northern townships. The Washington coal does not outcrop north of the main line of the Pennsylvania Railroad in northwestern Washington County.

The Washington coal outcrops in Jefferson township between Eldersville and the eastern township line. The coal is 5 feet thick and is separated into numerous benches by clay and shale partings. A middle bench, 2 feet 9 inches thick, is minable.

The outcrop extends eastward into Smith township and practically all the territory south of Cherry Valley town is underlain by the Washington coal. It appears to be thin and has not been successfully mined at any locality.

The Washington coal is present in the hills north of Hickory and west of Menden in Mount Pleasant township. The entire bed averages 5 feet thick. It is usually separated into five benches by bone and shale partings.

The Washington coal outcrops on North, Middle, and South Forks of Cross Creek, and on Cross Creek proper. It averages over 5 feet thick including partings. The main bench is usually the thickest, ranging from 1 foot 6 inches to 2 feet 5 inches thick. The bottom and top benches range from 10 to 18 inches thick. Small country pits have been opened in it and some coal has been produced for local fuel.

The Washington coal does not outcrop in Chartiers township. Its outcrop can be seen in the fields in the highest hills of Cecil township between Millers Run and Chartiers Creek. The coal is too near the surface to be of any value.

The Washington coal has a limited outcrop in the hills in the vicinity of Thompsonville in Peters township. At this locality it averages 4 feet 4 inches thick including two partings aggregating 10 inches thick. The top and bottom benches are fairly good coal. The top bench is the thicker, averaging 2 feet. No coal is being mined from this bed.

Middle townships. Practically all of Independence township is underlain by the Washington coal. It is being mined at a few points, and the entire bed is locally over 8 feet thick. The main and lower bench is usually between 5 and 6 feet thick. The coal above is a useless mixture of bone and clay. The main bench is locally very fine coal, but generally contains numerous bone and sulphur streaks and thin knife blades of shale.

The outcrop of the Washington coal is also extensive in Hopewell township, and is being mined in numerous country banks. The coal ranges from 7 to 9 feet thick. The main and bottom benches range from 3 feet 8 inches to 5 feet 8 inches thick. The portion of the bed above the main bench is a mixture of clean coal, bony coal, and clay, which is not minable. The lower bench appears to be good coal, but is rather high in ash.

In Canton township the Washington bed is thinner, but in general has very good quality. It is separated into two benches by a clay parting 2 to 6 inches thick. The top bench is 6 to 10 inches thick, and the bottom bench 4 feet thick. It is being mined in the vicinity of Wolftown for local domestic fuel.

The Washington bed outcrops extensively in Buffalo township, where it is mined at many localities for domestic fuel. The quality of the bed is extremely variable, as is its thickness. In some localities the coal is excellent; in others it is extremely high in ash. The thickness of the bed is also extremely variable. At one locality northeast of Taylorstown the bed has a total thickness of 20 feet, including a clay parting approximately 5 feet below the top, 8 feet thick. The coal occurs in three main benches having thicknesses, in descending order, of 5 feet 2 inches, 3 feet 4 inches, and 2 feet 8 inches. The minable value of these benches varies, but the middle bench is usually coal of fair quality. Farther south of Taylorstown, and west of Buffalo Creek, the bed thins down and occurs in a single bench. It is not opened, but outcrops indicate that it averages less than 2 feet thick. In the eastern part of the township, along the Baltimore and Ohio Railroad, the bed is over 8 feet thick including clay and shale partings 4 feet 10 inches thick.

In Blaine township, on Buffalo Creek, the bed is between 2 and 3 feet thick. It has been mined locally, although bone and shale partings are difficult to separate from the coal.

The Washington coal presents a variable section in North and South Franklin townships. It never occurs in a single bench, but is much parted by shale. The coal benches are generally thin, the thickest being 3 feet. The presence of so many partings materially affects the value of the coal. It will probably be a valuable source of domestic fuel in the future.

Southern townships. The Greene group outcrops in the Southwestern townships of Washington County, and the Washington coal is under cover. Drillings for oil and gas indicate that it varies little in its physical character from the descriptions given of it in adjoining townships.

The coal again appears on Tenmile Creek in the eastern part of Morris township. In the vicinity of Hackneys and Ringland it is 4 feet 4 inches thick, including two clay partings aggregating 12 inches thick. The top bench of coal is 18 inches thick, the middle 8 inches, and the bottom 14 inches.

The Washington coal outcrops extensively in Amwell township and is mined at numerous localities for domestic fuel. The entire bed averages between 3 and 4 feet thick, including clay partings aggregating 10 to 12 inches thick. The top bench is usually the thickest coal, but averages less than 18 inches thick.

The Washington coal outcrops in the highlands of West Bethlehem township between Tenmile Creek and Daniels Run, and between Daniels Run and the South Branch of Pigeon Creek. It averages less than 3 feet thick, the good coal being confined to a lower bench averaging less than 2 feet thick. It has been opened up at two or three localities but no coal is being produced from it.

The Washington coal is either too thin to merit discussion or has been eroded in all the eastern townships of Washington County.

The foregoing descriptions of the Washington bed will probably lead to the impression that it is of little value. This bed is very irregular in thickness and habit of deposition. The chemical character is undoubtedly greatly variable although no authentic analyses have been made of this coal by this Survey in cooperation with the United States Bureau of Mines. Sight determinations indicate that the Washington coal is extremely high in ash. Farmers who burn it have found it locally to be a most excellent fuel. Many farmers though have been compelled to construct special grates to burn it because of the bulky nature of its ash. Mining this bed will undoubtedly be difficult, principally because of the numerous clay, shale, and bone coal partings. The roof will be difficult to control in most localities, and the irregularity in thickness of the bed will involve much expenditure in driving entries to find coal of minable thickness.

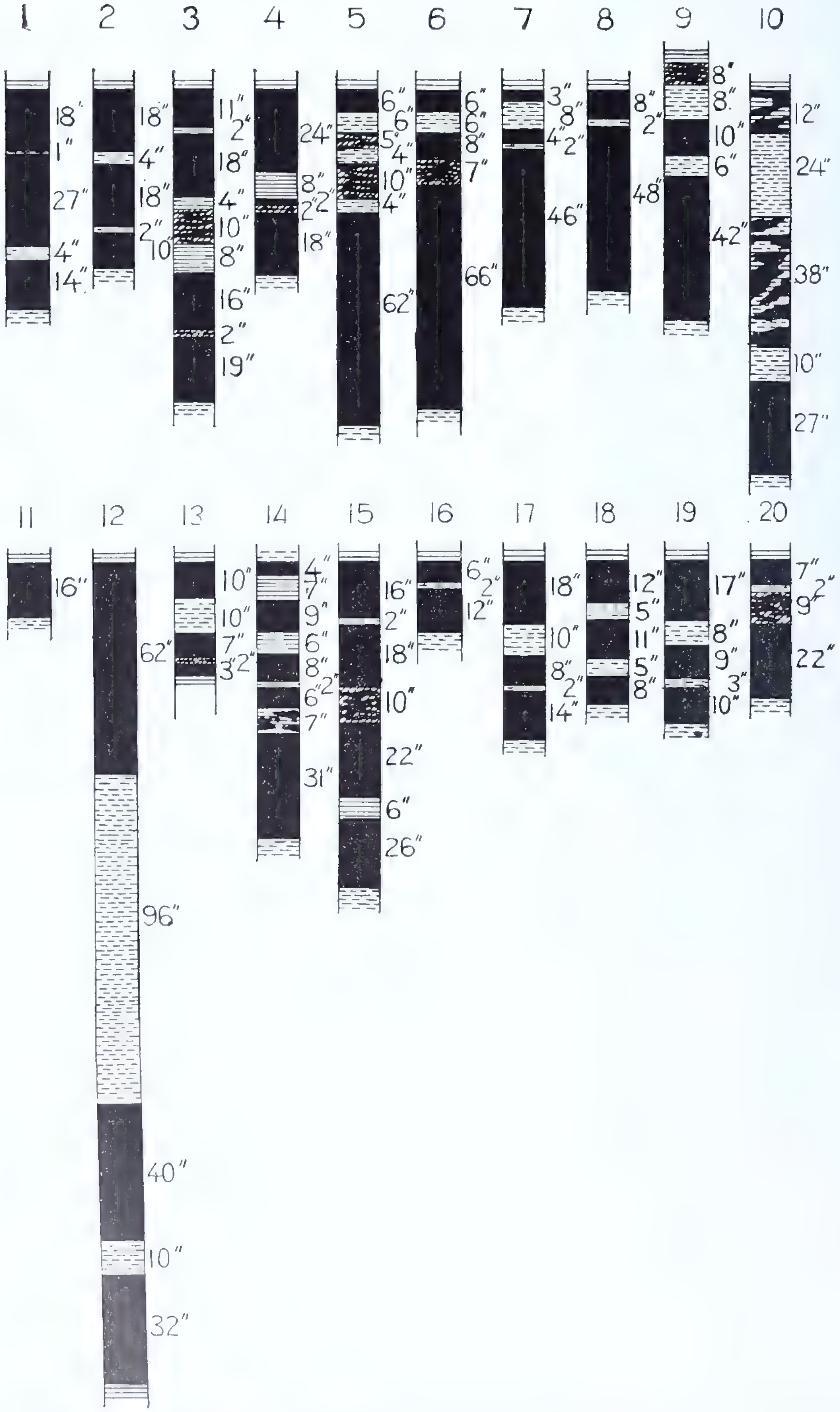


Figure 139. Sections of Washington coal in Washington County.

1. Outcrop at fork of South Fork of Cross Creek 2 miles northeast of West Middletown, Cross Creek township.
2. Outcrop in road just northeast of Cross Creek town, Cross Creek township.
3. Outcrop in road 1¼ miles southwest of Hickory, Mount Pleasant township.
4. Outcrop in road ½ mile southwest of Thompsonville, Peters township.
5. Outcrop on Buffalo Creek at Welch Hollow, Independence township.
6. Outcrops on north slope of Brush Run ½ mile northeast of Acheson, Hopewell township.
7. Outcrop in road 1 mile northwest of Buffalo, Hopewell township.
8. Outcrop in railroad cut, at Sugar Hill, Canton township.
9. Outcrop on road 1 mile southwest of Wolftown, Canton township.
10. Outcrop in creek 1 mile north of Coffeys Crossing, Buffalo township.
11. Outcrop in railroad cut 1¼ miles east of Claysville, Buffalo township.
12. Outcrop in run 2 miles northeast of Taylorstown, Buffalo township.
13. Outcrop on Brush Creek, 1½ miles northeast of Acheson, Blaine township.
14. Outcrop in cut on B. & O. Railroad at West Washington, North Franklin township.
15. Outcrop on Cemetery Hill, 1 mile south of Washington, North Franklin township.
16. Outcrop on headwaters of Tenmile Creek 2 miles northwest of Van Buren, South Franklin township.
17. Outcrop on Tenmile Creek 1 mile west of Hackneys, Morris township.
18. Outcrop at Tenmile town, on Tenmile Creek, Amwell township.
19 Outcrops on Bane Creek near West Amity, Amwell township.
20. Outcrops on Daniels Run 2 miles southwest of Scenery Hill, West Bethlehem township.

SUMMARY.

Washington County contains the second greatest reserve of coal in Pennsylvania, the greater part of which is in the Pittsburgh bed (3,516,860 short tons).

The southeastern tip of Washington County belongs in the Pittsburgh coking coal district. A narrow belt extending in a northeast-southwest direction across the south central part of Washington County is a typical gas coal district. In the central and northern parts of the county the coal is classed as a steam coal. The development of the Pittsburgh bed has been retarded in most of the county because the bed lies deep under cover and the cost of shafting has been prohibitive because the coal can be mined much cheaper along its outcrop. For many years the mines on the Monongahela River have been gradually working westward and some of them will soon reach the limit of profitable underground hauling. Shafts will then be driven in the central and western parts of Washington County and the coal hauled overland.

The Pittsburgh bed is controlled by numerous large holding companies and represents one of the greatest future supplies of excellent bituminous coal in Pennsylvania. These companies have drilled rather extensively on their properties but unfortunately the information gained from this drilling is rightfully withheld from publication because certain facts might influence the sale value of the coal. In general the Pittsburgh bed has practically the same chemical and physical character throughout its entire area in Washington County. Mining conditions will probably be more difficult in the central and western parts of the county than along Monongahela

River because the roof is soft and many feet of shale, clay, and bone coal will have to be held up by rather extensive timbering. The bottom appears to be hard clay or limestone throughout the entire area. Locally, extra partings may be present in the bed but in practically every drill hole the usual three benches have been found.

The four beds, lying above the Pittsburgh, having a possible commercial value are, in ascending order: Redstone, Sewickley, Waynesburg, and Washington. Practically the only value of these beds has been for local fuel. During war time they were mined and the coal hauled by truck to sidings as a supplementary supply for local manufacturing use. The opinion of coal men in general has been that these beds give little promise of future value. This Survey believes, however, that they will be mined on a large commercial scale after the Pittsburgh has been exhausted. By that time suitable methods will have been invented for making use of high-ash coal, either by pulverizing or by use at the mines in generating electricity. Again, when the thick Pittsburgh has been depleted, the towns of Washington County will have to depend upon shipped-in coal or use coal mined from these beds.

The Allegheny group, the top of which will probably average about 625 feet below the Pittsburgh, contains numerous coal beds which are important in adjoining counties. These coal beds are deep under cover everywhere in Washington County. Their thickness is known principally from a great many oil and gas wells. In churn drilling it is possible to obtain only the approximate thickness of a coal bed, therefore there is no information as to the exact character of these beds. It is known, however, that there is at least one thick bed of coal in this group which has been known to the oil and gas drillers as the Connellsville coal, which lies at the approximate horizon of the Upper Freeport. Another coal, some 200 feet below this thick one, is also of minable thickness in a great many localities. In the distant future, after the coal reserves of the eastern part of the United States have reached depletion, these beds, lying in some instances 1300 or 1400 feet beneath the surface, will be shafted to and mined.

Washington County is interesting in that it contains geologically the highest coals in the State of Pennsylvania, namely, those in the Dunkard group of the Permian system. None of these coals are of minable thickness.

CHAPTER XXIV.

WESTMORELAND COUNTY.

INTRODUCTION.

Westmoreland County is a close second to Fayette County as a bituminous coal producer. These counties produce about one-third of the bituminous coal mined in Pennsylvania, and about one-ninth of the output of the United States.

There are sixteen coal beds of minable thickness in the county. The Pittsburgh coal is by far the most important and is minable wherever it occurs. The Brookville, Lower Kittanning, Middle Kittanning, Lower Freeport, Upper Freeport, Redstone, Sewickley, Uniontown, and Waynesburg beds are workable locally. The Mahoning, Brush Creek, Bakerstown, Harlem, Duquesne, and Washington coals may be utilized when the thicker beds are mined out.

Westmoreland County has been a large producer for many years, and the chief source of this supply, the Pittsburgh coal, is being exhausted rapidly. However, there are many other beds, yet undeveloped and even unprospected in some areas, which will become more and more important, and eventually supply the total output. Little attention has been given these beds until lately because the Pittsburgh coal has so overshadowed them in importance. Much prospecting in recent years has proved that they lack continuity and uniformity but locally are minable beds of good quality.

The main line of the Pennsylvania Railroad enters the county east of Seward, and runs through Derry, Latrobe, Greensburg, and Jeannette to Pittsburgh, giving fine transportation facilities to every coal district near it. Branches from the main line serve mining towns scattered over the county. The main line of the Baltimore and Ohio Railroad follows the Youghiogheny across the southwest corner of the county and has a branch to Everson and Mount Pleasant. The Pittsburgh and Lake Erie Railroad follows the west bank of the Youghiogheny across Rostraver township. The Ligonier Valley Railroad runs between Latrobe, Ligonier, and Wilpen. The Pittsburgh, Westmoreland, and Somerset Railroad runs from Ligonier across the eastern county line to Somerset, Somerset County.

Although Westmoreland County has but few miles of frontage on Monongahela River, many tons of coal are shipped each year by barge, especially to Pittsburgh and points along the Ohio.

The county has an unusually large mileage of improved roads. Most of the township roads are dirt, and are kept in good condition. More coal is hauled over the roads in the eastern than in the western townships, because they are not so well served by railroads. During the time of excessive prices for coal, thousands of tons were hauled to sidings, but now little coal is hauled over the roads except for local use.

With these transportation facilities Westmoreland County can ship its coal to any point. A large percentage of the coal is made into coke for use in the furnaces at Pittsburgh; an enormous quantity is shipped to large cities for gas manufacture; the remainder is used for steaming purposes. Probably the largest tonnage is shipped to the Central States and to the Lake trade.

The topography of the county is diversified. Laurel Hill, along the eastern boundary, is over 2700 feet above sea level and, with Chestnut Ridge, forms a mountainous belt. The county west of Chestnut Ridge is decidedly hilly, but these hills rise to a common level, and viewed from a high point resemble a gently rolling plain. The main streams flow across anticlines through narrow gorges; in the basins they have broad fertile valleys with gentle slopes. Four great terraces, the remnants of which represent the Schooley, Harrisburg, and Worthington peneplains and the Parker strath, have great extent in the county. Elevations range from 2780 feet above sea level on the crest of Laurel Hill, to 750 feet on Monongahela River.

STRUCTURE.

Eleven structural features, each having a general southwest trend, have been recognized and studied. They are, in order from east to west: Laurel Hill anticline, Ligonier syncline, Chestnut Ridge anticline, Latrobe syncline, Fayette anticline, Greensburg syncline, Grapeville anticline, Irwin (Port Royal) syncline, Elders Ridge syncline, Murrysville anticline, and Duquesne syncline.

Laurel Hill anticline, on the eastern edge of the county, is a great fold that has brought the Pottsville and Mauch Chunk rocks to outcrop. The axis is highest on the county line southeast of Wilpen; from that point it dips gradually north and south. The rocks dip steeply but regularly into the Ligonier syncline on the west.

Ligonier syncline crosses the Conemaugh below New Florence, extends southwest, and leaves the county midway between Jones Mills and Donegal. It is a long narrow basin with irregular dips and minor folds along its axis. The rise of the rocks to the east averages about 25 per cent, and is fairly regular, but on the west the rise is irregular, with local dips as high as 80 per cent.

Chestnut Ridge anticline, lying west of Ligonier syncline, crosses the north boundary of the county near Bolivar, and leaves the south boundary a few miles west of Donegal. It is a pronounced fold, having, with local exceptions, regular dips on both flanks. The total descent is greater on the eastern side. The axis varies much in elevation.

Latrobe syncline, lying northwest of Chestnut Ridge anticline, forms a long narrow basin extending between Blairsville and Scottdale. The axis varies in elevation as though affected by numerous small cross anticlines. The dips on the east flank are rather high and regular but on the west flank they vary greatly.

Fayette anticline, the next structure to the west, crosses the Conemaugh a few miles west of Blairsville, and extends southwest to Jacobs Creek, a few miles west of Tyrone Mills. Its maximum development is on Jacobs Creek and at a point west of Latrobe. It descends about 2 miles northeast of Loyalhanna Creek, rises again into an elongated dome, then plunges and rapidly disappears near Conemaugh River.

Greensburg syncline crosses the county just west of Blairsville, through Greensburg to Sewickley Creek, its total length in Westmoreland County being approximately 26 miles. It is a minor feature on Sewickley Creek, but deepens rapidly to a point 2 miles north of Greensburg where the Pittsburgh coal is 775 feet above sea level. The axis rises gradually to the northeast, the Pittsburgh coal being nearly 1390 feet above tide north of New Alexandria. The dips are regular on both flanks.

Grapeville (Jacksonville) anticline crosses the Conemaugh about 2 miles southeast of Saltsburg, extends southwest near Jeannette and ends just north of Walts Mill on Sewickley Creek. The anticline rises gradually from Sewickley Creek to a point about 3½ miles northeast of Jeannette, where the Pittsburgh coal is 1800 feet above sea level. The elevation of the axis decreases gradually northeast and the Pittsburgh coal has an elevation of 1630 feet a mile north of Congruity. The dips are regular and gentle on both flanks.

Irwin (Port Royal) syncline has its northern end about 2 miles north of Export, and extends southwest through Manor, crossing the Youghiogheny at Port Royal just west of Smithton. In the vicinity of Herminie the basin is broad and flat, with the Pittsburgh coal less than 600 feet above tide. The basin narrows, the slopes become steeper, and the axis rises northeast to a point about 1 mile southeast of Export, where the Pittsburgh coal is 950 feet above tide. The axis rises more rapidly northeastward and the Pittsburgh coal outcrops 3 to 4 miles northwest of Export, where a minor roll splits the syncline.

Elders Ridge syncline is really a continuation of the Irwin syncline with a saddle separating them. The axis dips gently northeast, and continues as a minor structure across the Kiskiminetas at Edri.

Murrysville anticline crosses the Kiskiminetas a few miles west of Salina, extends southwest near Murrysville and leaves the county about 1 mile southwest of Trafford City. It is a broad, well-developed structure, with gentle, uniform dips on both flanks. At Trafford City the Pittsburgh coal is 1280 feet above sea level; the axis rises rapidly northeast until the Pittsburgh coal is 1750 feet above sea level near the Kiskiminetas.

Duquesne syncline crosses the northwest corner of the county as a broad shallow basin with the rocks rising gently on both flanks. The axis is fairly uniform in elevation.

The northern continuation of the Amity anticline probably extends along Allegheny River in Westmoreland County. It has not been studied, but evidently is a minor feature.

STRATIGRAPHY.

The outcropping rocks of Westmoreland County are of Quaternary, Carboniferous, and Devonian age. The Quaternary is represented by river deposits of recent age, and by the Carmichaels formation. The Carboniferous is represented by the Washington, Monongahela, Conemaugh, and Allegheny groups, and the Mauch Chunk, and Pocono series. The Devonian is represented by the Catskill series.

The stream deposits are sands, clays, and gravel which the streams are depositing on their flood plains at high water. The Carmichaels formation is limited almost entirely to the larger valleys, where it occurs as unconsolidated deposits of sand, clay, and gravel on terraces or in abandoned channels.

The Washington group has been almost entirely eroded from the county, remaining in a few hilltops in the deepest basins, particularly in the southwestern part of the county. It is composed of shales, thin limestones, shaly sandstones, and one workable coal bed.

The Monongahela group is present only in the synclinal basins. It contains five workable coal beds, including the Pittsburgh coal. The group is extremely calcareous, with few massive sandstones and many feet of sandy shales. It averages about 400 feet thick.

The Conemaugh group is present in the basins and on the flanks of the synclines. It is composed chiefly of green and red shale, several coarse sandstones, numerous thin limestones and five coal beds that locally are of workable thickness. Its average thickness is about 645 feet.

The Allegheny group is present in practically the entire county, except where the anticlines have raised the Pottsville to outcrop in the high ridges. It is composed largely of shale, with a few heavy sandstones, clay beds, limestones, and three coal beds locally of workable thickness. Its average thickness is about 285 feet.

The Pottsville series, outcropping only on the high ridges in the eastern part of the county, is composed of two massive sandstones, with sandy shale between them. It is not coal bearing.

The Pocono and Catskill series are composed of massive sandstones and a heavy bed of siliceous limestone. They are not coal bearing. They have a limited outcrop on the crests of Laurel and Chestnut ridges.

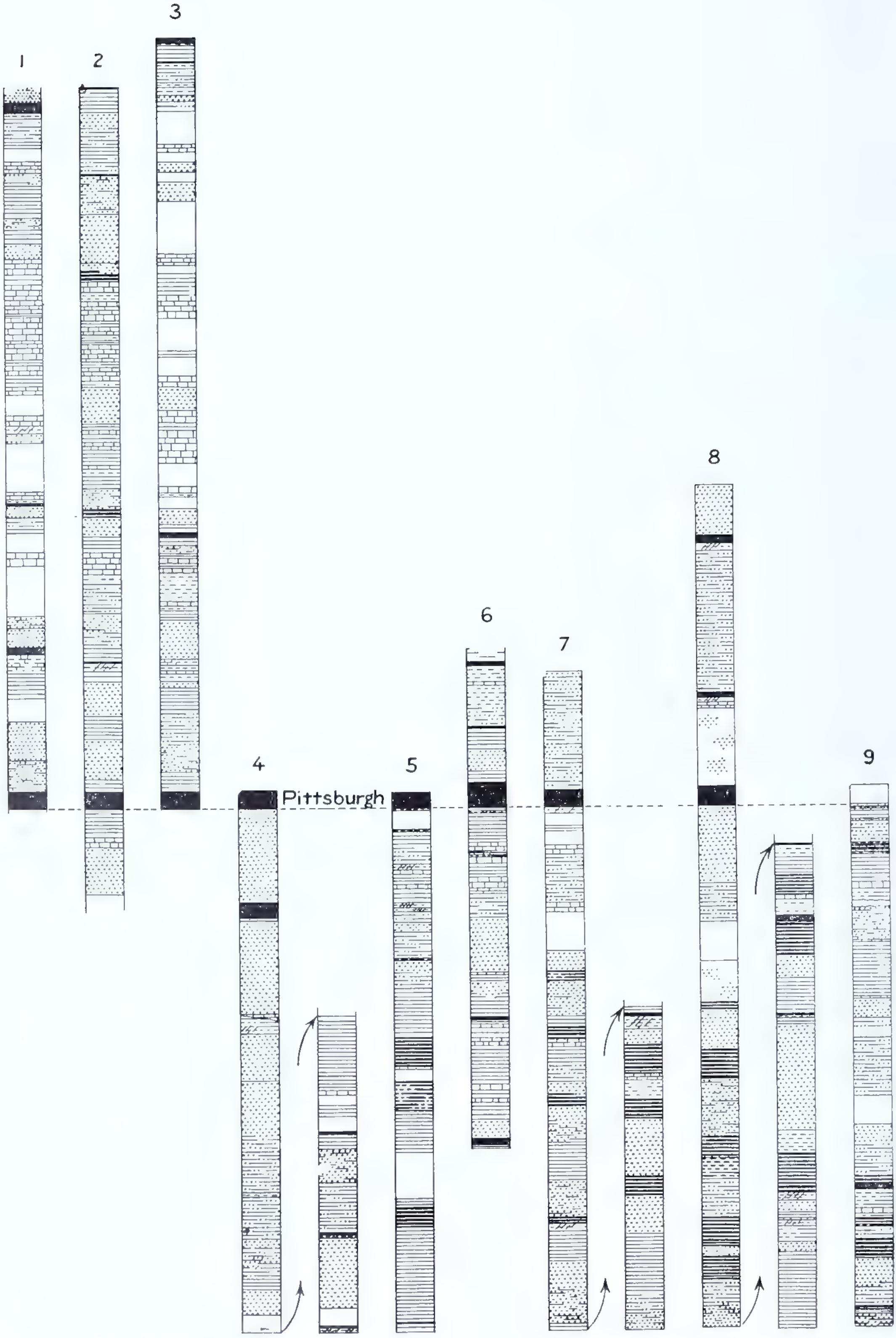


Figure 140. Stratigraphic sections. Westmoreland County.

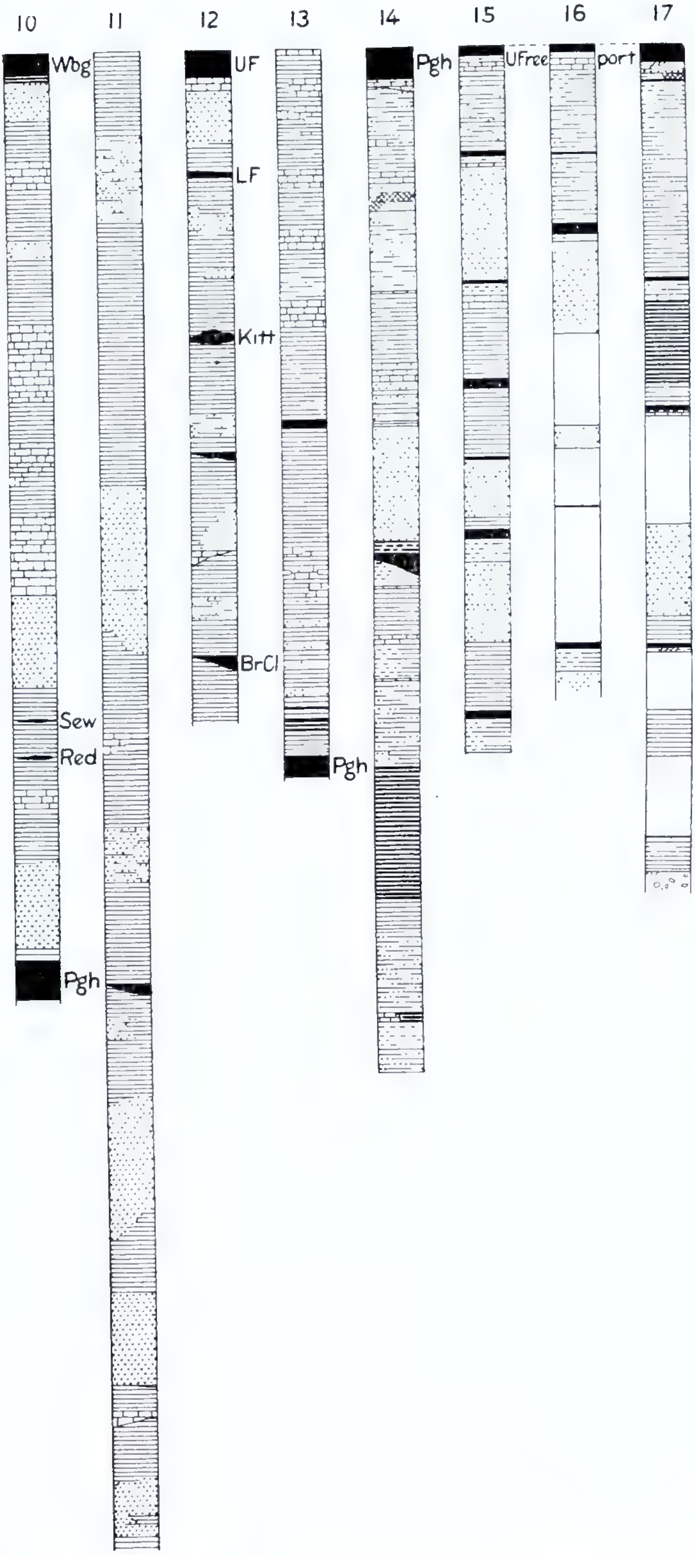


Figure 141. Stratigraphic sections cont'd. Westmoreland County.

1. Generalized section at Herminie.*
2. South of Export. B.M. 1204 to B.M. 1212.
3. Along Lincoln Highway southwest of Irwin.
4. On Thom Run, east of B.M. 1077 to B.M. 1316.
5. On Saltsbury Pike east of Sardis.
6. Railroad cut tunnel at Radebaugh.
7. Near Pleasant Valley.
8. From Newlonsburg to B.M. 1271.
9. On P. R. R. tracks west of Irwin.
10. Generalized section, Monongahela group. U. S. G. S. Latrobe Folio.
11. Generalized section, Conemaugh group. U. S. G. S. Latrobe Folio.
12. Generalized section. U. S. G. S. Latrobe Folio.
13. Section at Greensburg. Pennsylvania Second Geological Survey, Rept. KK, p. 294.
14. Section west of Irwin. Pennsylvania Second Geological Survey, Rept. KK, p. 348.
15. Generalized section, Allegheny group, in Ligonier Valley. Pennsylvania Second Geological Survey, Rept. KKK, p. 27.
16. Section north of Cucumber Run, Stewart township. Pennsylvania Second Geological Survey, Rept. KKK, p. 89.
17. On Tub Mill Run, Fairfield township. Pennsylvania Second Geological Survey, Rept. KKK, p. 158.

*Sections 1 to 9 measured by M. E. Johnson.

COALS.

The following table shows the stratigraphic relation of the coal beds, their range in thickness, and the average intervals between them.

Coal beds in Westmoreland County.

Group	Name of bed	Average interval	Range in thickness of coal beds		
			Ft.	Ft.	in.
Monongahela 400	Washington		0	2	0
		120			
	Waynesburg		0	10	6
		115			
	Uniontown		0	2	0
		145			
	Sewickley		0	1	0
		75			
	Redstone		0	6	6
		65			
	Pittsburgh		5	8	0
		280			
Conemaugh 645	Duquesne		0	1	2
		35			
	Harlem		0	4	0
		69			
	Bakerstown		0	7	4
		170			
	Brush Creek		0	1	6
		45			
	Mahoning		0	3	0
		55			

Coal beds in Westmoreland County

			Ft.	Ft.	in.
Allegheny 285	Upper Freeport ("E")		0	7	2
		60			
	Lower Freeport ("D")		0	2	10
		50			
	Upper Kittanning ("C′")		0	5	0
		40			
	Middle Kittanning ("C")		0	5	0
		40			
	Lower Kittanning ("B")		0	5	0
		60			
	Clarion ("A′")		0	3	6
		35			
	Brookville ("A")		0	5	0

The Westmoreland County coal field is divided into districts by four synclinal basins, which are named from the principal towns situated in them, Ligonier basin, Latrobe basin, Greensburg basin, and Irwin basin. The coals differ in thickness, number, chemical quality, and physical character in each of these basins or districts. The important coals will be discussed by districts; to avoid repetition the less important ones will be discussed with the county as a unit. The discussion of coal beds is in ascending geologic order.

BROOKVILLE (A) COAL.

The Brookville, lying a few feet above the Pottsville sandstone, and having a maximum thickness of 5 feet, is extremely impure. Its average thickness is less than 18 inches. The bed was opened in the Ligonier district many years ago for domestic fuel, but the openings are now fallen shut. In the central and western parts of the county the bed lies at great depth, and is known only from drill records; locally it gives promise of some value. Many sections of the Brookville have been measured in Westmoreland County, but in none of them is the coal thick enough or of sufficiently good quality to be mined.

CLARION (A′) COAL.

The Clarion coal is thinner but better in quality than the Brookville. It is sulphurous and carries many partings. Where prospected in the Ligonier district it has a maximum thickness of 3 feet 6 inches, but is dirty. West of Chestnut Ridge it is several hundred feet under cover and may never be mined.

PLATE XIV.

A. Coal mining town in Westmoreland County.

B. Pittsburgh coal in a Westmoreland County mine.

LOWER KITTANNING (B) COAL.

The Lower Kittanning outcrops along the Conemaugh, and on the east and west slopes of the Ligonier basin. Although it is very important on the Conemaugh, very few openings have been made in it elsewhere. The bed appears to be entirely lacking on Chestnut Ridge, but on Laurel Hill it is a good thick coal.

The Lower Kittanning coal averages about 3 feet thick in St. Clair township, where it will be mined extensively in the future. At Boltz it is 2 feet 9 inches thick, with a small bone parting near the middle. At Seward it is 3 feet thick, and has only one small parting in the lower half. The bed is thicker at New Florence, but the upper part is bony and impure, and the binder in the middle is much thicker than at Seward. The coal is 4 feet 6 inches thick at Lockport in Fairfield township, but has a large shale parting near the middle, besides several local bone partings. The bed is 3 feet thick at Bolivar, but is very dirty and high in sulphur.

In Ligonier and Cook townships the bed has been opened only along Laurel Hill. Here it ranges from 3 feet 6 inches to 4 feet thick, with an impure bony top bench, 12 inches, and a thin parting in the middle. The coal, which is fairly high in ash and sulphur, is hard and blocky above the parting; below it, soft and friable.

The Lower Kittanning has been mined at Kregar in Donegal township, where it is 3 feet 8 inches thick, and has only one small bone binder near the middle. The quality is excellent and the bed is free from rolls. Although it has not been prospected much in this township, there are indications that the Lower Kittanning may be mined extensively in the future.

The Lower Kittanning is deep under cover in the central and western parts of Westmoreland County, and will not be mined for a great many years. It has been reported in a great many oil and gas drillings, and ranges from a few inches to 4 feet thick.

The Lower Kittanning is 2 feet thick in southern Franklin township; 2 feet 2 inches thick in North Huntingdon township; and 2 feet 10 inches thick in northern Sewickley township. It is either very thin or entirely lacking in Rostraver township. In general, the Lower Kittanning is thin in the Irwin basin.

The Lower Kittanning is deep under cover in the Greensburg basin, but may be of minable thickness in some localities. It is practically untested.

The correlation of the Kittanning coals in the Latrobe basin is very indefinite because these coals lie at considerable depth in the center of the basin and have not been prospected where they outcrop on its flanks.

At least one of the Kittanning coals is minable. On Chestnut Ridge, a coal, probably one of the Kittanning coals, lying about 160 feet below the Upper Freeport, is 3 to 4 feet thick. Where opened about 3 miles north of Long Bridge, it is 3 feet 3 inches thick. A bed that probably is the Upper Kittanning has been opened on Chestnut Ridge southwest of Loyalhanna Creek, and is 5 feet thick, including 2 feet of shale in the middle of the bed. On Chestnut Ridge southeast of Latrobe, a bed 100 to 130 feet below the Upper Freeport, is 3 feet thick.

A coal in the Kittanning group has been recorded in many oil and gas wells. It ranges from a few inches to 4 feet thick.

MIDDLE KITTANNING (C) COAL.

The Middle Kittanning bed is almost entirely lacking in eastern Westmoreland County. On Indiana Creek it locally reaches a maximum thickness of 2 feet 6 inches, but is dirty. In the northern part of the Ligonier basin it is a thin but clean coal that may be used when the thicker beds have been worked out. It is deep under cover in the central and western parts of the county, has been recorded in many drill records, and is locally a good thick coal.

The Middle Kittanning has been drilled through at several points in the Irwin basin, and is locally thick enough to be mined. It is 1 to 5 feet thick 1¼ miles west of Salina; 2 feet 10 inches thick in southeastern Franklin township; 3 feet 8 inches thick in northeastern North Huntingdon township; and 3 feet 7 inches thick in northern Sewickley township. These thicknesses may be local.

UPPER KITTANNING (C′) COAL.

The outcrop of the Upper Kittanning is confined to the valley of Conemaugh River, the west slope of Laurel Hill, and to the east slope of Chestnut Ridge. It has been opened in a few places for house coal, but not for shipping. The coal is clean, averages about 1 foot 8 inches thick, and is fairly low in ash and sulphur. Extreme variability in thickness makes mining uncertain. The coal reaches its maximum thickness of 5 feet in St. Clair township, where it has been mined for local use, and carries several thin bone partings, and a local draw slate on the roof. It is 1 foot 10 inches thick on Tubmill Creek, and 2 feet 8 inches thick on Baldwin Creek.

In Fairfield township, the coal varies much but averages 1 foot 8 inches thick. It has been opened for local use by farmers, and is a good clean coal, free from impurities.

In Ligonier and Cook townships, the Upper Kittanning coal has not been mined. Its outcrop averages about 18 inches thick. Little is known of its extent and character in Donegal township but probably it does not exceed 18 inches in average thickness.

The Upper Kittanning seems to be absent in the Irwin basin. It is thin and lenticular in the Greensburg and Latrobe basins. Mining this bed will be particularly hazardous because it thickens and thins within short distances.

LOWER FREEPORT (D) COAL.

The Lower Freeport bed, lying about 60 feet below the Upper Freeport, is extremely variable in thickness, and is entirely lacking in large areas. Its greatest thickness probably is on its eastern outcrop on Chestnut Ridge.

In Donegal, Cook, and Ligonier townships the Lower Freeport coal is thin and irregular, at most measuring 1 foot 8 inches. It has not been opened, but apparently is clean and free from partings.

On Tubmill Creek, Fairfield township, the coal is 2 feet 8 inches thick including a 2-inch clay parting 11 inches from the bottom, and 2 inches of bony coal at the top. On the Conemaugh it is 2 feet 10 inches thick, with a 1 to 3 inch bone parting 10 inches from the bottom. The coal is hard, very high in fixed carbon, medium in ash, but high in sulphur.

In St. Clair township, the bed is extremely irregular, ranging from a few inches to 2 feet thick. Examination of the coal is difficult because openings made to supply local demand are now fallen shut.

The Lower Freeport is lenticular and nowhere over 12 inches thick in the Irwin basin. In the Greensburg and Latrobe basins it may be locally minable.

UPPER FREEPORT (E) COAL.

The Upper Freeport is the most important coal in the Allegheny group in Westmoreland County. It is mined at numerous places, but there are few large commercial mines in this bed.

The Upper Freeport bed is easily accessible in every township in the Ligonier district, and has been mined in many places for local use and for shipment. It is extremely variable in thickness and quality, but is a very valuable coal in some areas. It appears to be thin on Laurel Hill, thickening toward the center of the basin, and to its western outcrop on Chestnut Ridge.

Ligonier basin. The bed outcrops on the west slope of Laurel Ridge in St. Clair township, and has been mined extensively for custom coal on Baldwin Creek. It averages about 3 feet thick, and is good, clean coal, though locally it carries two or three thin shale partings, and a few inches of bone coal at the top. The upper part of the bed is a hard coal with brilliant luster, the lower part is dull, friable, and rather high in sulphur. A local lower division of the bed, which is not mined, ranges from 8 inches to 1 foot 8 inches thick, and is separated from the main part of the bed by more than a foot of fire clay.

The Upper Freeport coal has been mined commercially in Fairfield township only along Conemaugh River. Large untested areas, especially along the western slope of Laurel Ridge, give promise of great future value. The greatest thickness of the bed on Tubmill Creek is reported to be 8 feet 7 inches, including all impurities. The upper division is 3 feet 5 inches thick, with a 1 to 4 inch bone parting 12 inches from the top. The coal is hard, brilliant, and fairly low in ash and sulphur. The lower division, 4 feet 6 inches thick, is separated from the upper division by an 8 inch shale parting. The lower coal is dull, friable, and carries pyrite nodules as the only distinct impurity. The bed has a maximum thickness of 7 feet 5 inches at Lockport, including a 2 inch clay parting about 2 feet above the bottom. The coal is hard and high in ash and sulphur. The fixed carbon is also high. The bed averages between 6 and 7 feet thick at Bolivar, where it is mined extensively. Bony coal, 10 to 12 inches thick at the top of the bed, is the principal impurity. Pyrite makes the bed rather high in sulphur.

In Ligonier township the whole bed is 5 to 7 feet thick. The upper division has a maximum thickness of 4 feet 4 inches, and is invariably divided into two benches by a 2 inch bone parting. The lower division, which is inferior in quality, and varies greatly in thickness, is separated from the upper division by 11 inches of clay. West of Ligonier on Loyalhanna Creek the bed is locally in one bench, with a maximum thickness of 4 feet 2 inches. The coal is rather dirty and high in sulphur, although locally its quality is excellent.

In Cook and Donegal townships the bed is thin and often lacking along the west slope of Laurel Hill. It appears to thicken in the center of the Ligonier basin and on the east slope of Chestnut Ridge. This area has not been tested sufficiently as yet to obtain an accurate idea of the thickness and quality of the coal. At Kregar, a coal, which probably is the Upper Freeport, is 4 feet 6 inches thick, including generally three small bone partings. This thickness appears to be local. At Roaring Run the bed is double. An upper 8 inch division is separated from the lower division, 2 feet thick, by 3 feet of clay and shale.

Latrobe basin. The Upper Freeport is the most important bed in the Allegheny group in the Latrobe basin. It is of minable thickness practically everywhere. It has been mined extensively near Blairsville Intersection, where it has an average thickness of 2 feet 10 inches including a 2 inch shale parting 3 inches above the bottom. At Derry the bed is thicker, averaging 5 feet, including a bone and shale parting 10 to 14 inches thick 1 foot 10 inches to 2 feet 8 inches above the bottom. In the vicinity of Kingston, and on Miller Run, the coal is 4 feet 8 inches thick including a ½-inch bone parting 8 inches below the top. At Youngstown the bed is 4 feet 5 inches thick including a shale parting, 1 inch thick, 18 inches above the bottom.

The coal thickens north of Loyalhanna Creek, and east of Derry measures 7 feet 2 inches, including 18 inches of shale 2 feet 6 inches from the bottom. Just east of Derry, on the summit of Chestnut Ridge, the coal is 6 feet 3 inches thick, including 3 inches of shale 4 feet from the bottom. The coal is opened at many places between Derry and the Conemaugh, and is 2 to 4 feet thick.

Greensburg basin. The Upper Freeport is by far the most important coal in the Allegheny group in the Greensburg basin. It ranges from 3 feet to 6 feet 1 inch in Loyalhanna township. The quality is good, but usually the bed carries two or three shale or clay partings. This coal has been replaced by sandstone in most of Salem township, and in the northern part of Hempfield township. In southern Hempfield township, near Hunkers, the coal ranges from 4 feet 11 inches to 5 feet 6 inches thick, including a 2-inch clay parting 1 foot 10 inches above the bottom. Near Ruffsdale the bed is 2 feet 3 inches thick, including two clay partings 1 and 2 inches thick.

At Donohoe the bed has a total thickness of 3 feet 4 inches including three bone partings, ½ to 1 inch thick, in the bottom half of the bed.

Irwin basin. The Upper Freeport coal is the most important coal in the Allegheny group in the Irwin basin. In Allegheny, Washington, Bell, and Loyalhanna townships, it ranges from 3 feet to 4 feet 4 inches thick and generally is clean, except for local bone partings. In Upper and Lower Burrell townships the bed ranges from 3 feet 6 inches to 5 feet 8 inches thick, is very dirty locally, and carries several bone and shale partings in addition to a few inches of bony coal at the top of the bed.

The Upper Freeport coal is faulted out by sandstone in southern Washington and northern Salem townships; in all of Franklin but the northwestern corner; all of Penn township; in northern Hempfield; and southern North Huntingdon township.

In Sewickley township the Upper Freeport ranges from 2 feet to 4 feet 2 inches thick, and usually carries two or three clay and shale partings. The bed has a local maximum thickness of 6 feet in Rostraver township.

The Upper Freeport coal in the Irwin basin averages approximately 33 per cent volatile matter, 55 per cent fixed carbon, 8 per cent ash, and 2 per cent sulphur. It is soft, friable coal that breaks up when mined.

Western townships. The Upper Freeport is mined extensively in Allegheny township. The coal is very regular in thickness and in physical character. It regularly occurs in two benches separated by a shale parting 1 to 2 inches thick. The bottom bench ranges from 2 to 4 inches thick, and the top bench from 2 feet 7 inches to 3 feet 1 inch thick.

The Upper Freeport is mined extensively in Lower Burrell township. It varies much in physical and chemical character, although it usually resembles the coal in Allegheny township. Locally the bed thickens to 7 feet, but contains 12 to 14 inches of bone coal at the bottom, and 9 to 10 inches of bone coal 1 foot 9 inches to 2 feet 7 inches above the bottom. Usually a bony bench occurs at the top of the bed and separates it from a canneloid coal bench 12 inches to 2 feet thick.

Where mined in Washington township the bed averages 3 feet 8 inches thick. It occurs in two benches separated by a bone coal parting, 2 inches thick, 4 inches above the bottom.

In Bell township the coal is regular in thickness and quality. It averages 4 feet thick, and locally is entirely clean. Usually it contains one bone parting, 1 inch thick, 3 inches above the bottom. Locally another bone parting, 1 inch thick, is present.

The Upper Freeport is mined extensively in Hempfield township, particularly in the vicinity of Hunkers, Foxtown, New Stanton, and Youngwood. The coal is good, and averages 4 feet 6 inches thick, although locally it is much thinner. The top bench ranges from 2 feet to 3 feet 9 inches thick. It is separated from a bottom bench by a shale parting 1 to 2 inches thick. The bottom bench is usually 12 inches thick. Locally an additional 1-inch bone parting is present 14 inches above the bottom.

The Upper Freeport varies much in thickness in East Huntingdon township. It contains two bone partings, 1 to 3 inches thick, at various positions in the bed. The entire bed ranges from 2 feet 3 inches to 5 feet thick.

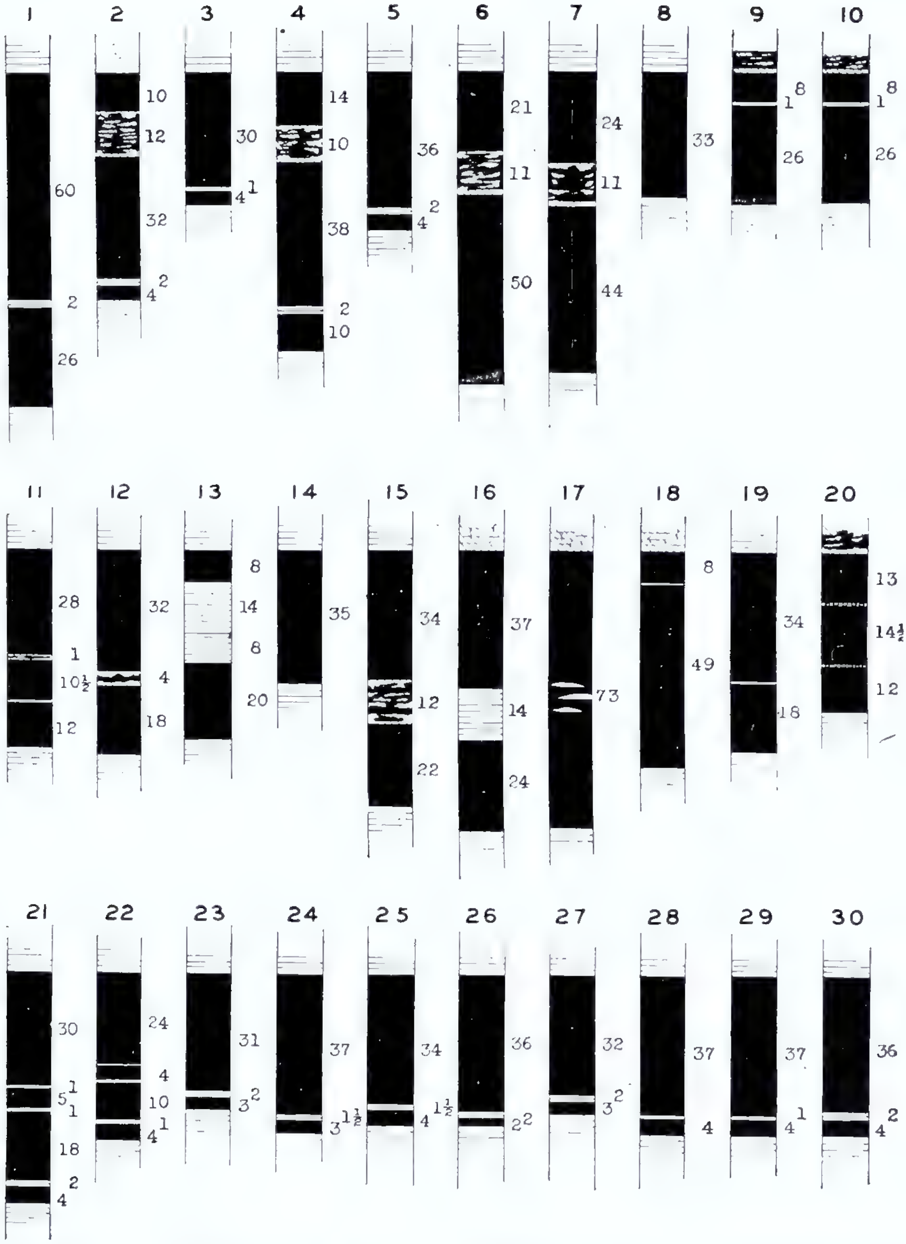


Figure 142. Sections of Upper Freeport coal in Westmoreland County.

1. Outcrop on south slope of Conemaugh River just west of St. Clair township line, Fairfield township.
2. Fairfield Coal & Coke Co. Fairfield mine, on west bank of Conemaugh River, 4/5 mile southeast of Lockport station, Fairfield township.
3. H. A. Turner Coal Co. Turner mine, 3/5 mile southeast of Lockport station on west bank of Conemaugh River, Fairfield township.
4. Fairfield Coal & Coke Co. Lacolle No. 1 mine, ½ mile south of Bolivar station on Tubmill Run, Fairfield township.
5. Ridgeview Coal Co. Ridgeview No. 1 mine, at West Bolivar, 1 mile south of Bolivar station, Fairfield township.
6. Cline Coal Co. Cline No. 1 mine, 1 mile southwest of Bolivar station, Fairfield township.
7. Greensburg Fuel Co. Bolivar No. 1 mine, ¼ mile south of Bolivar station, Fairfield township.
8. Outcrop on Laurel Run near junction of the two main forks, Ligonier township.

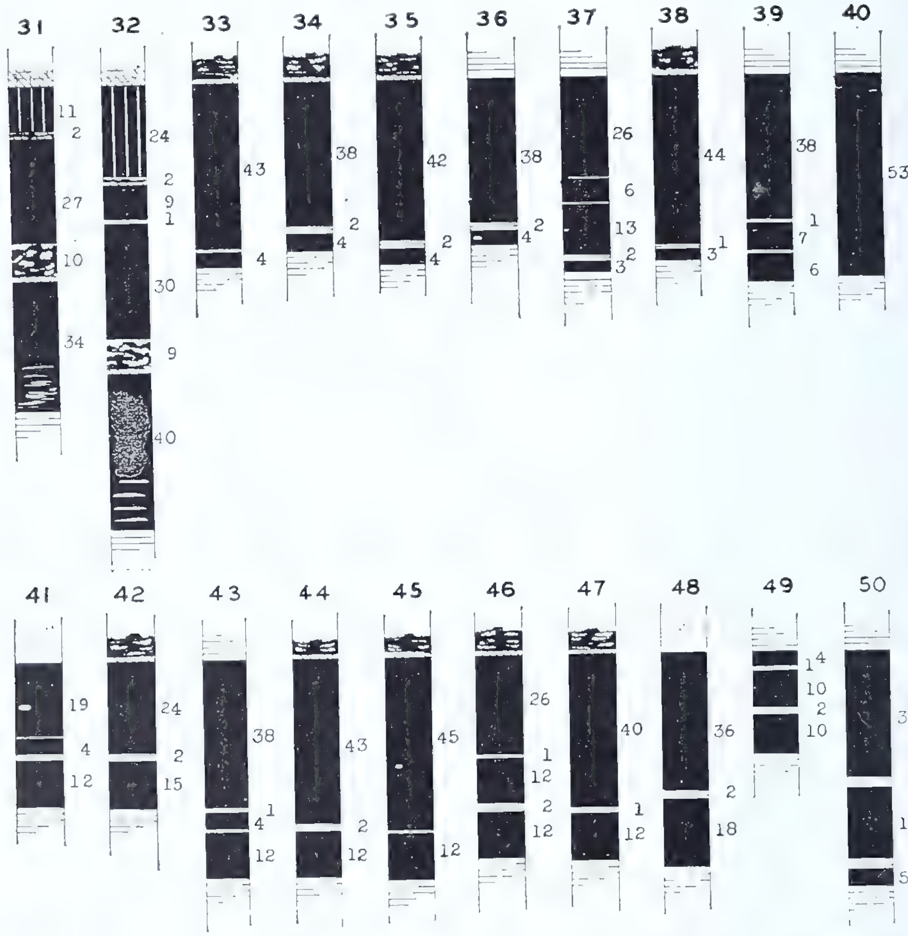


Figure 143. Sections of Upper Freeport coal in Westmoreland County.

9. Frank E. Shirey. Darlington mine, at Darlington station, on Loyalhanna Creek, Ligonier township.
10. Fern Coal Co. Fern mine, ½ mile southeast of Longbridge station on Loyalhanna Creek, Ligonier township.
11. Outcrop on headwaters of Whiteoak Creek, Cook township.
12. Outcrop on west slope of Loyalhanna Creek, 1 mile east of Pleasant Grove, Cook township.
13. Outcrop on Indian Creek, 1 mile east of Franklin, Donegal township.
14. Packsaddle Coal Co. Packsaddle No. 1 mine, ⅕ mile east of station at Blairsville Intersection, Derry township.
15. Derry Coal Co. Decco mine, on Saxman Run, ½ mile west of Derry station, Derry township.
16. Ridge Coal Co. Frances mine, 1 mile west of Derry station, Derry township.
17. Latrobe High Grade Coal Co. Pearl mine, 1 mile west of Derry station, on Saxman Run, Derry township.
18. Peters Paper Co. Kingston mine, on Miller Run, 1 mile northeast of Kingston station.
19. Outcrop at Youngstown, Unity township.
20. Keystone Coal Co. Mooween mine, on Conemaugh River 1 mile east of Saltsburg and opposite White station, Loyalhanna township.
21. Outcrop on Loyalhanna Creek at Snodgrass Mill, Derry township.
22. Outcrop on Pennsylvania Railroad, ½ mile east of Donohoe, Unity township.
23. Ben Franklin Coal Co. Metcalf mine, at Metcalf station on east bank of Allegheny River, Allegheny township.
24. Dalliba Coal Co. McKean mine at McKean station on east bank of Allegheny River, Allegheny township.
25. Phillips Coal Co. Phillips mine at Garvers Ferry station, east side of Allegheny River, Allegheny township.
26. Pierson Coal Mining Co. Pierson mine on south bank of Kiskiminetas River, 1 mile southeast of Kiskiminetas Junction, Allegheny township.

27. Dalliba Coal Co. Dalliba No. 1 mine, ½ mile west of Bagdad station, Allegheny township.
28. West Penn Mining Co. West Penn mine, 1 mile north of Hillville, Allegheny township.
29. Valley Coal Co. Valley mine on south bank of Kiskiminetas River at Leechburg station.
30. Avonmore Coal & Coke Co. Pine Run mine, on Pine Run 1½ miles west of Vandergrift, Allegheny township.
31. Valley Camp Coal Co. Kinloch mine, on Puckety Creek 2 miles northwest of Drennen, Lower Burrell township.
32. Valley Camp Coal Co. Valley Camp No. 1 mine, 1 mile north of Arnold on east bank of Allegheny River, Lower Burrell township.
33. United States Aluminum Co. Aluminum mine, on Monongahela River opposite Tarentum, Lower Burrell township.
34. Osiel Coal Co. Osiel mine on south bank of Chartiers Run, ¼ mile southeast of Edgecliff station, Lower Burrell township.
35. Ben Franklin Coal Co. Braeburn mine at Braeburn station on east bank of Allegheny River, Lower Burrell township.
36. Kiski Valley Coal Co. Kiski Valley mine, 1 mile north of West Apollo station on west bank of Kiskiminetas River, Washington township.
37. Kiskiminetas Coal Co. Roaring Run No. 1 mine on south bank of Kiskiminetas River at Truxal station (Roaring Run), Bell township.
38. Apollo Coal Mining Co. Northwest No. 1 mine, 1 mile northwest of Salina on south side of Kiskiminetas River, Bell township.
39. Cochran Coal Co. Cochran No. 1 mine, ¼ mile west of Salina, ¼ mile west of Salina station on south bank of Kiskiminetas River, Bell township.
40. Cochran Coal Co. Cochran No. 2 mine, 1 mile east of Salina station on a branch of Wolford Run, Bell township.
41. Lowe Coal Co. Lowe mine at Youngwood, Hempfield township.
42. Premier Fuel Co. Ruff mine, ½ mile southeast of Youngwood on Sewickley Creek, Hempfield township.
43. Youngwood Coal & Coke Co. Foxtown mine at Foxtown, near Youngwood, Hempfield township.
44. Catherine Coal Co. Gail mine, near New Stanton, Hempfield township.
45. Brinkley Coal Co. Brinkley mine, 1 mile southeast of Hunkers, Hempfield township.
46. Hunker Steam Coal Co. Reed mine at Hunkers, Hempfield township.
47. Penn Valley Coal Mining Co. Beck No. 1 mine, on Sewickley Creek 1 mile west of Hunkers, Hempfield township.
48. Sheffler Coal Co. Sheffler mine, on Sewickley Creek 1½ miles west of Hunkers, Hempfield township.
49. Outcrop on Buffalo Run, near Ruffsdale, East Huntingdon township.
50. Outcrop on Jacobs Creek, at Tyrone Mills, East Huntingdon township.

CONEMAUGH COALS.

There are several thin coals in the Conemaugh group that have no commercial importance at present. These are, in ascending order: Mahoning, Brush Creek, Anderson, Bakerstown, Harlem, Duquesne, Wellersburg, Little Clarksburg, and Little Pittsburgh. Of these the Mahoning, Brush Creek, Harlem, and Duquesne may be mined locally in the future, when the thicker beds are worked out.

The Mahoning coal, about 55 feet above the Upper Freeport, is a dirty bed of coal, nowhere over 3 feet thick, that has been used locally for house fuel. It contains one main shale parting near the middle and several thin ones scattered through the bed. The Mahoning coal averages 33 per cent volatile matter, 52 per cent fixed carbon, 10 per cent ash, and 3 per cent sulphur.

A bed 45 to 60 feet above the Mahoning coal has been correlated as the Brush Creek. It is a thin coal of good quality and has been mined in many places for house fuel. It averages 12 inches thick, has no partings, and is low in sulphur and ash.

The Bakerstown coal, lying about 60 feet below the Harlem coal, is very irregular in thickness and commonly is thin. The bed is thickest 4½ miles southwest of Greensburg on Little Sewickley Creek where it has been mined and mistaken for the Upper Freeport. Here it is composed of 5 feet of soft coal, 16 inches of cannel coal, and 12 inches of bony coal. The coal is 32.7 per cent volatile matter, 44.9 per cent fixed carbon, 20 per cent ash, and 2.6 per cent sulphur.

The Harlem coal, lying about 315 feet below the Pittsburgh coal, averages 12 inches thick, and locally has a maximum thickness of 4 feet. The coal is an excellent smithing and steam coal and has been used more than any other Conemaugh coal for house fuel.

The Duquesne coal has been recorded only in the western part of the county, where locally it is over 12 inches thick. It appears to be good coal but has been little used.

PITTSBURGH COAL.

The Pittsburgh coal has been the most important bed in Westmoreland County. It is gradually approaching exhaustion, and many areas have been entirely mined out.

Ligonier basin. One of the oldest mining districts is in the vicinity of Ligonier where the Pittsburgh coal is present only on the high divides in the center of the basin in Ligonier and Fairfield townships, and underlies only a little more than 3000 acres. Much of it has been mined out. The upper division of the bed is seldom over a few inches thick, and the lower division is 7 to 8 feet thick, including two or three thin bone partings. The coal is soft, friable, and prismatic in structure. The sulphur ranges from below 1 to 3 per cent, and the ash from 6 to 9 per cent. The fixed carbon averages 64 per cent, and the volatile matter 24 per cent.

In the vicinity of Oak Grove the Pittsburgh bed is 5 feet 10 inches thick, including one or two bone partings. It usually occurs in two benches. The bottom bench is usually 2 feet 6 inches thick, and the top bench 4 feet thick. Locally the top bench has 4 inches of bone coal 1 foot 8 inches from the top. On Hannas Run the bed has a total thickness of 5 feet 4 inches including 3 inches of bony coal 2 feet 8 inches above the bottom. In the vicinity of Wilpen the coal ranges from 5 feet to 6 feet 6 inches thick. A persistent bone or shale parting ½ inch to 3 inches thick, is present 2 feet 6 inches to 2 feet 10 inches above the bottom. A local bone parting, 2 inches thick, is present 16 inches below the top. In the vicinity of Fort Palmer the Pittsburgh coal is 6 feet 6 inches thick, including a 1-inch shale parting 2 feet 4 inches above the bottom, and 5 inches of bone 6 inches below the top

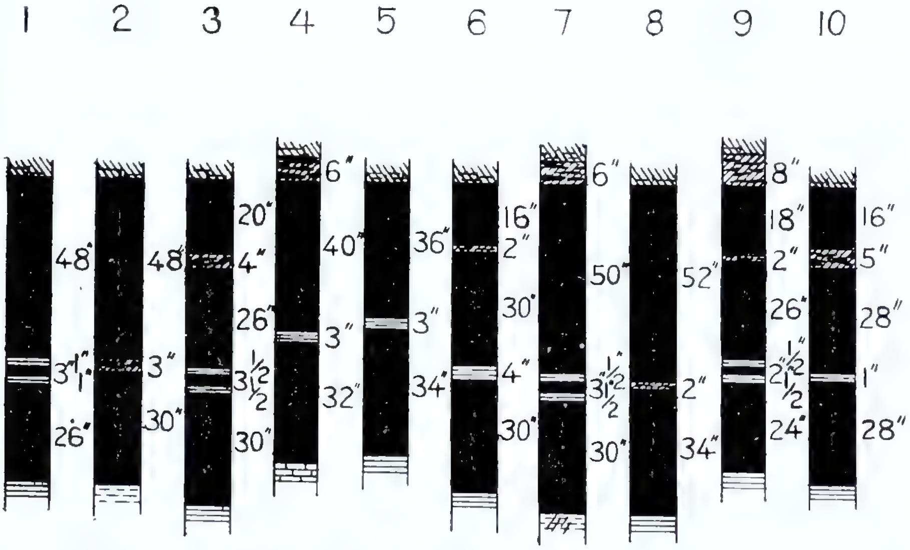


Figure 144. Sections of Pittsburgh coal in the Ligonier Valley, Westmoreland County.

1. Saint Clair Coal Company. Saint Clair mine, on Hannas Run ¾ mile northwest of Oak Grove, Ligonier township.
2. Ligonier Diamond Coal & Coke Company. Diamond No. 2 mine, on Hannas Run, 1 mile northwest of Oak Grove, Ligonier township.
3. Greensburg-Connellsville Coal & Coke Company. Old Colony No. 1 mine, ¾ mile north of Old Colony, and 1¾ miles northwest of Oak Grove, Ligonier township.
4. Ramsey Coal Company. Ramsey No. 2 mine, 9/10 mile northwest of Wilpen Junction and 1 mile southwest of Wilpen, on Hannas Run, Ligonier township.
5. Tosh Coal Company. Tosh mine, ¾ mile west of Wilpen, Ligonier township.
6. Marietta-Connellsville Coke Company. Marietta No. 3 mine, 1 mile west of Wilpen, Ligonier township.
7. Vogele Coal Company. Vogele mine, 1 mile northwest of Wilpen Junction, Ligonier township.
8. Connellsville Coke & Fuel Company. Hazelburg mine, 1 mile northwest of Wilpen Junction, Ligonier township.
9. The Shenango Furnace Company. Wilpen mine, ½ mile northwest of Wilpen, Ligonier township.
10. Westmoreland-Connellsville Coal & Coke Company. Fort Palmer No. 1 mine, at Fort Palmer, Fairfield township.

Latrobe basin. The Latrobe basin includes the nothern end of the Connellsville coking coal field. The Pittsburgh coal has the same coking quality as at Connellsville, except in the area northeast of Latrobe.

The Pittsburgh coal in the Latrobe basin consists of a roof division, a main clay parting, and a main division. The roof division is worthless, being composed of a number of alternating bands of coal and clay.

The lower division consists of an upper bench, the breast coal, 3 to 4 feet thick; underlying this is a small bench, from 2 to 4 inches thick, separated from the coal above and below by knife edges of bone. This bearing-in bench is underlain by a bench 12 inches thick, which, from its blocky character, is generally known as the brick coal. An impure bottom bench, 12 to 18 inches thick, is separated from the brick coal by a thin bone parting. This bench is generally so impure that it is not mined.

In the northern part of Derry township the Pittsburgh coal is 6 feet thick, including a 2-inch bone parting 15 inches above the bottom. The bed thickens southward, and at Hillside it has a maximum thickness of 8 feet including an 8-inch shale parting 12 inches above the bottom, and a ½ to 1 inch bone parting 4 feet 2 inches to 4 feet 4 inches below the top. At Ridgeview Park the coal thins to 7 feet 2 inches. A 10-inch bone or shale parting is present 16 inches above the bottom. The Pittsburgh coal has practically the same thickness in the vicinity of Millwood, but it is split by three bone and shale partings in the lower part of the bed. These partings vary in thickness, but their average aggregate thickness is 6 inches. The bottom parting is thickest, ranging from 4 to 14 inches.

In the vicinity of Derry the Pittsburgh coal is 7 feet 4 inches thick, including an 8-inch shale and clay parting 18 inches above the bottom.

The Pittsburgh coal is being mined extensively in the vicinity of New Derry where it ranges from 7 feet 3 inches to 10 feet 3 inches thick. It contains from two to five bone and shale partings ranging from ½ inch to 8 inches thick. The Pittsburgh coal thins to an average thickness of 6 feet in the vicinity of Bradenville. It contains two shale partings each ½ inch thick separated by 3 inches of coal. The topmost of these partings generally occurs 2 feet 3 inches to 2 feet 6 inches above the bottom.

In the vicinity of Latrobe the Pittsburgh coal averages 8 feet 4 inches thick. Its physical character here resembles very much that of the same bed in the Connellsville district. It is separated into three benches by shale partings ¼ to ½ inch thick. The top bench averages 4 feet thick, the middle bench 3 inches, and the bottom bench 3 feet 6 inches thick.

In the vicinity of Beatty station the Pittsburgh bed averages 8 feet thick. The bearing-in partings are ½ inch thick, and the bearing-in bench 3 inches thick. The top bench ranges from 4 feet to 4 feet 6 inches thick, and the bottom bench from 3 feet to 3 feet 2 inches thick.

At Baggaley the bed has a total thickness of 8 feet 4 inches. The bearing-in partings are 1 inch thick, the bearing-in bench 2 inches thick. The top bench averages 4 feet thick, and the bottom bench 3 feet 8 inches. The bed is overlain by bony coal.

In the vicinity of Hostetter the bed has the same thickness and physical character. At Whitney the bed averages 8 feet 9 inches thick. The bearing-in partings are ½ to 1 inch thick, and the bearing-in bench 4 inches thick. The top bench is 5 feet 4 inches thick, and the bottom bench 3 inches thick. The Pittsburgh bed is slightly thinner in the vicinity of Pleasant Unity, but at Humphrey the total thickness is 10 feet 9 inches. The bed contains three bone and shale partings ½ to 1 inch thick. The top bench is 5 feet 7 inches thick, the middle bench 3 feet thick. Two thin bottom benches are present, 6 and 18 inches thick.

At Mammoth the Pittsburgh coal is 7 feet 1 inch thick, including a ½-inch shale parting in the middle. The top bench averages 4 feet 1 inch thick, and the bottom bench 3 feet. At Carpentertown the bed is identical with the exception that the bearing-in bench, 6 inches thick, is present with shale partings, 1 inch thick, above and below it. At Stewart the bed thickens to 8 feet 3 inches. In addition to the usual bearing-in bench with partings above and below it, there is a shale parting, ½ inch thick, in the middle of the upper bench. At Udell the bed is 8 feet thick. The bearing-in bench is 6 inches thick with 1-inch partings above and below it. The top bench averages 5 feet 4 inches thick, and the bottom bench 3 feet.

In the vicinity of Mount Pleasant the Pittsburgh bed averages 8 feet 4 inches thick. The bearing-in bench ranges from 3 to 4 inches thick with ½-inch shale partings above and below it. The top bench ranges from 5 feet to 5 feet 2 inches thick. At Morewood the bed has a total thickness of 7 feet 11 inches. The bottom bench averages 2 feet 8 inches. The bearing-in bench is 2 feet thick with shale partings, ½ inch thick, above and below it. The top bench is 5 feet thick. This physical character is persistent at every locality in East Huntingdon township.

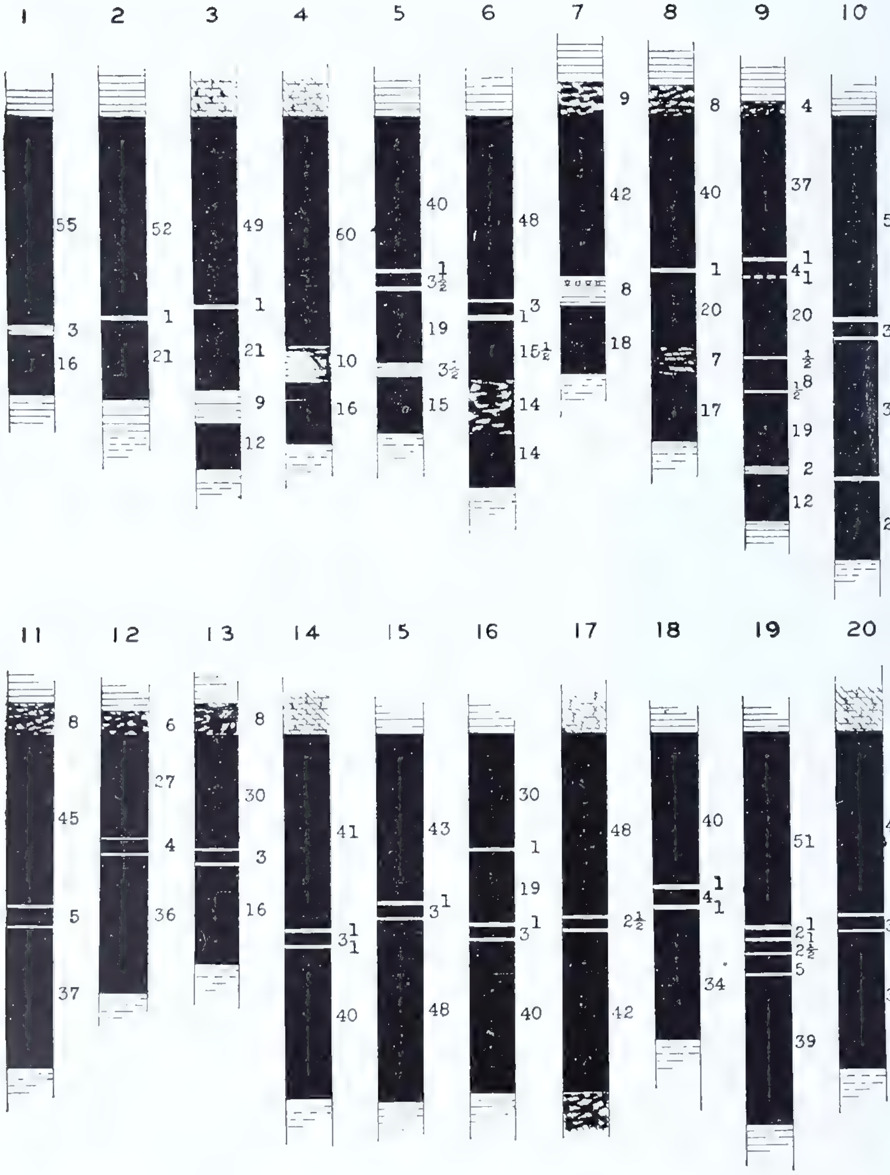


Figure 145. Sections of Pittsburgh coal in Latrobe Basin, Westmoreland County.

1. Maher and Graff Coal Company. River mine, on south bank of Conemaugh River, 1 mile south of Blairsville and 1 mile northwest of Cokeville, Derry township.
2. Westmoreland Mining Company. Graff No. 2 mine, 1½ miles north of Hillside Station, west of McGee Run, Derry township.
3. John Henigin. Graff No. 3 mine, ½ mile northwest of Hillside Station, on west slope of McGee Run, Derry township.
4. Seger Brothers Coal Company. Seger No. 1 mine, 1 mile northwest of Ridge View Park Station, on McGee Run, Derry township.
5. Barnett Coal Company. Millwood mine, on Stony Run, 2 miles northwest of Millwood Station, Derry township.
6. Alfred Barnett. Barnett mine, 1 mile northwest of Millwood, on McGee Run, Derry township.
7. Saxman Coal & Coke Company. Saxman No. 2 mine, on headwaters of Union Run, ½ mile northwest of Derry, Derry township.

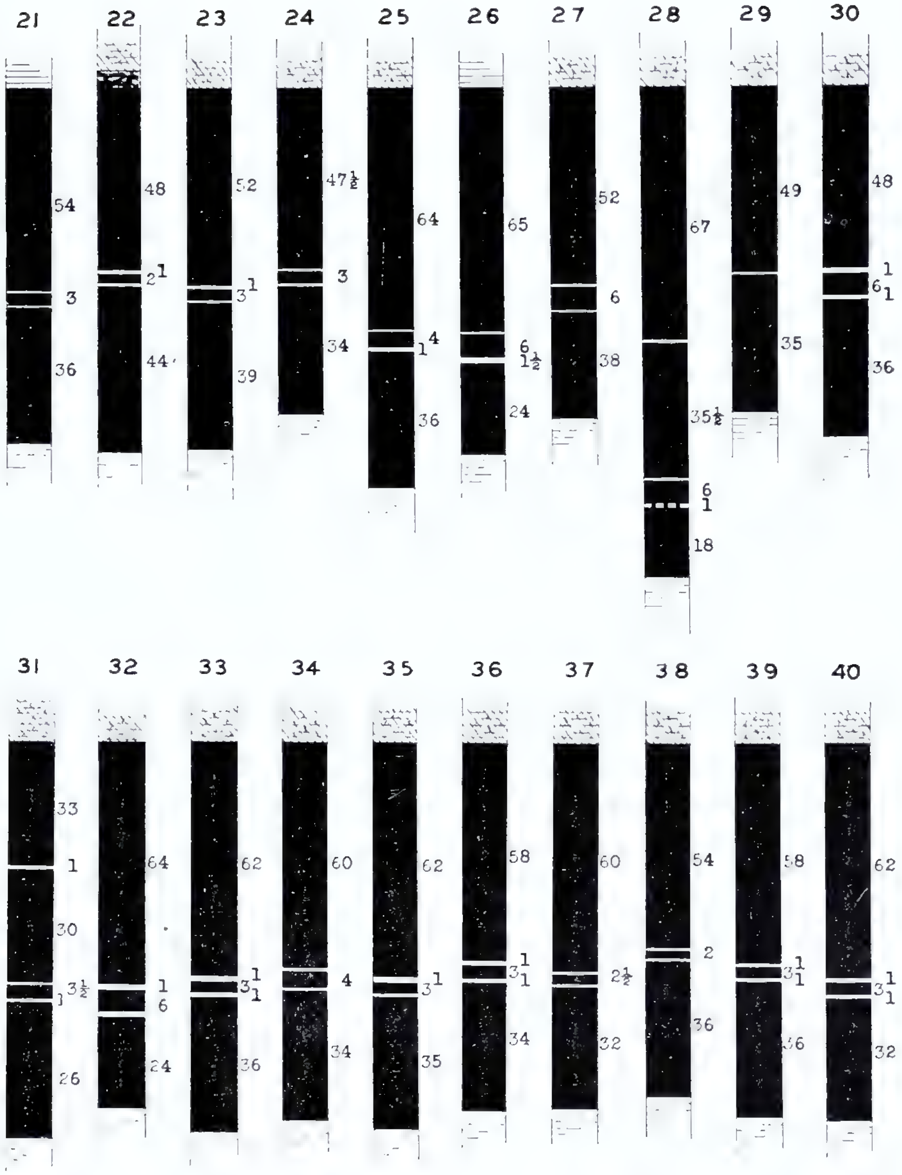


Figure 146. Sections of Pittsburgh coal in Latrobe Basin, Westmoreland County.

8. Latrobe-Connellsville Coal & Coke Company. Connellsville mine, on Union Run, 1 mile southwest of New Derry, Derry township.
9. Atlantic Crushed Coke Company. Atlantic No. 2 mine, on Stony Run, 1 mile northwest of New Derry, Derry township.
10. Mercer Coal Company. Sipe mine, on Union Run, 1½ miles southwest of New Derry, Derry township.
11. E. A. Humphries Coal & Coke Company. Chester No. 2 mine, on Union Run, 2 miles southwest of New Derry, Derry township.
12. Bradenville Coal & Coke Company. Bradenville mine, on Saxman Run, ¼ mile southwest of Bradenville Station, Derry township.
13. Latrobe Connellsville Coal & Coke Company. Derry No. 1 mine, on Saxman Run, ¾ mile northwest of Bradenville, near Loyalhanna, Derry township.
14. Greensburg-Eastern Coal Company. Dailey mine, ¼ mile east of Latrobe Station, Derry township.

15. City Coal Company. City No. 2 mine, ¾ mile southwest of Latrobe Station on Monastery Run, Unity township.
16. Railway Steel Spring Company. Latrobe mine, ¼ mile south of Latrobe, Unity township.
17. H. C. Frick Coke Company. Dorothy shaft, at Dorothy on Monastery Run, 1 mile south of Latrobe, Unity township.
18. Unity-Connellsville Coke Company. Elizabeth mine, on Loyalhanna Creek, ½ mile west of Osburn Station and 1½ miles southeast of Latrobe, Derry township.
19. Mt. Pleasant By-Product Coal Company. Saint Vincent mine, on Monastery Run, 2 miles southwest of Latrobe, Unity township.
20. John L. Beatty. John Beatty mine, on Fourmile Run, ¼ mile southeast of Beatty Station, Unity township.
21. Westmoreland-Fayette Coal & Coke Company. Ruth mine, on Fourmile Run, ¼ mile southwest of Beatty Station, Unity township.
22. H. C. Frick Coke Company. Baggaley mine, ½ mile north of Baggaley and 3 miles south of Latrobe, Unity township.
23. Hostetter-Connellsville Coke Company. Hostetter mine, ¼ mile southeast of Hostetter, Unity township.
24. Mount Pleasant Coke Company. Beatty No. 1 mine, 2 miles southwest of Beatty on headwaters of south branch of Fourmile Run, Unity township.
25. Hostetter-Connellsville Coke Company. Whitney mine, on Ninemile Run, ¾ mile northwest of Shirey school and ¾ mile south of Whitney, Unity township.
26. Clare Coke Company. Clare No. 4 mine, at Lycippus, Unity township.
27. Jamison Coal & Coke Company. Jamison No. 20 mine, ¼ mile southwest of Pleasant Unity, Unity township.
28. Humphreys Coal & Coke Company. Humphreys No. 1 mine, at Humphrey, Unity township.
29. H. C. Frick Coke Company. Mammoth mine, at Mammoth, Mount Pleasant township.
30. Mt. Pleasant Connellsville Coke Company. Mt. Pleasant mine, at Carpentertown, 1¼ miles southwest of Hecla, Mt. Pleasant township.
31. W. J. Rainey, Inc. Stewart mine, at Stewart, near Hecla, Mt. Pleasant township.
32. West Penn By-Product Coal Company. Marion mine, near Udell, Hempfield township.
33. Brush Run Coal Company. Brush Run No. 2 mine, 1 mile north of Mt. Joy and 2 miles east of Mt. Pleasant, Mt. Pleasant township.
34. Brush Run Coal Company. (AB) Brush Run No. 1 mine, 1 mile east of Mt. Pleasant, Mt. Pleasant township.
35. H. C. Frick Coke Company. Standard shaft, 1 mile north of Mt. Pleasant Borough, Mt. Pleasant township.
36. W. J. Rainey, Inc. Acme shaft, ¾ mile west of Mt. Pleasant, East Huntingdon township.
37. H. C. Frick Coke Company. South West No. 1 mine, at Morewood, ½ mile west of East Huntingdon township.
38. H. C. Frick Coke Company. Central mine, at Central, 1 mile east of Ruffsdale, East Huntingdon township.
39. H. C. Frick Coke Company. Alverton mine, 1¼ miles northwest of Alverton, East Huntingdon township.
40. A. C. Overholt Coal Company. West Overton mine, at West Overton, 1½ miles northwest of Scottdale.

Greensburg basin. The Pittsburgh bed has been mined extensively for a great many years in the Greensburg basin. It is an excellent steam coal and much of it is shipped to tidewater and the Lakes for this purpose. It can also be coked if washed. There are very few areas of virgin Pittsburgh coal remaining in the Greensburg basin. In general the Pittsburgh bed averages 8 feet thick and occurs in three benches, the top, the bearing-in, and the bottom. The top division of the Pittsburgh bed is bony and is not mined.

In the northern part of Derry township in the Greensburg basin, the Pittsburgh bed is 5 feet 6 inches to 8 feet thick. In addition to the two bearing-in partings, ½ to 1 inch thick, the bed has a shale parting, 8 to 12 inches thick, 18 inches to 1 foot 8 inches above the bottom.

In Salem township the bed averages 7 feet 6 inches thick, including three ¼ to ½ inch shale partings in the bottom half of the bed. The top bench ranges from 4 feet 2 inches to 4 feet 7 inches thick, and the bottom bench from 18 inches to 2 feet thick. The two middle benches are thin, ranging from 4 to 7 inches. At Crabtree the bed averages 6 feet thick, including three 1-inch shale partings below the top bench. The top bench is 4 feet 4 inches thick, the bottom bench 1 foot 8 inches thick, and the two middle benches 4 to 6 inches thick. The bed has the same physical character at Hannastown. On the Pennsylvania Railroad, in the vicinity of Donohoe, the bed averages 7 feet 6 inches thick and contains the two bearing-in partings separated by 4 inches of coal. The top bench is 4 feet 7 inches thick, and the bottom 2 feet 6 inches. At Luxor the bed has practically the same thickness, but an additional parting, ¾ inch thick, is present 4 inches above the usual top bearing-in bench. At Bovard the Pittsburgh coal is 6 feet 4 inches thick. The top bench is 4 feet thick, the bearing-in bench 6 inches, and the bottom bench 2 feet thick.

In the vicinity of Greensburg the Pittsburgh bed is very regular in thickness and physical character. It occurs in three benches. The top bench ranges from 3 feet 10 inches to 4 feet 5 inches thick. The bearing-in partings are ½ to 1 inch thick, and the bearing-in bench is usually 6 inches thick. The bottom bench ranges from 2 feet to 2 feet 6 inches thick.

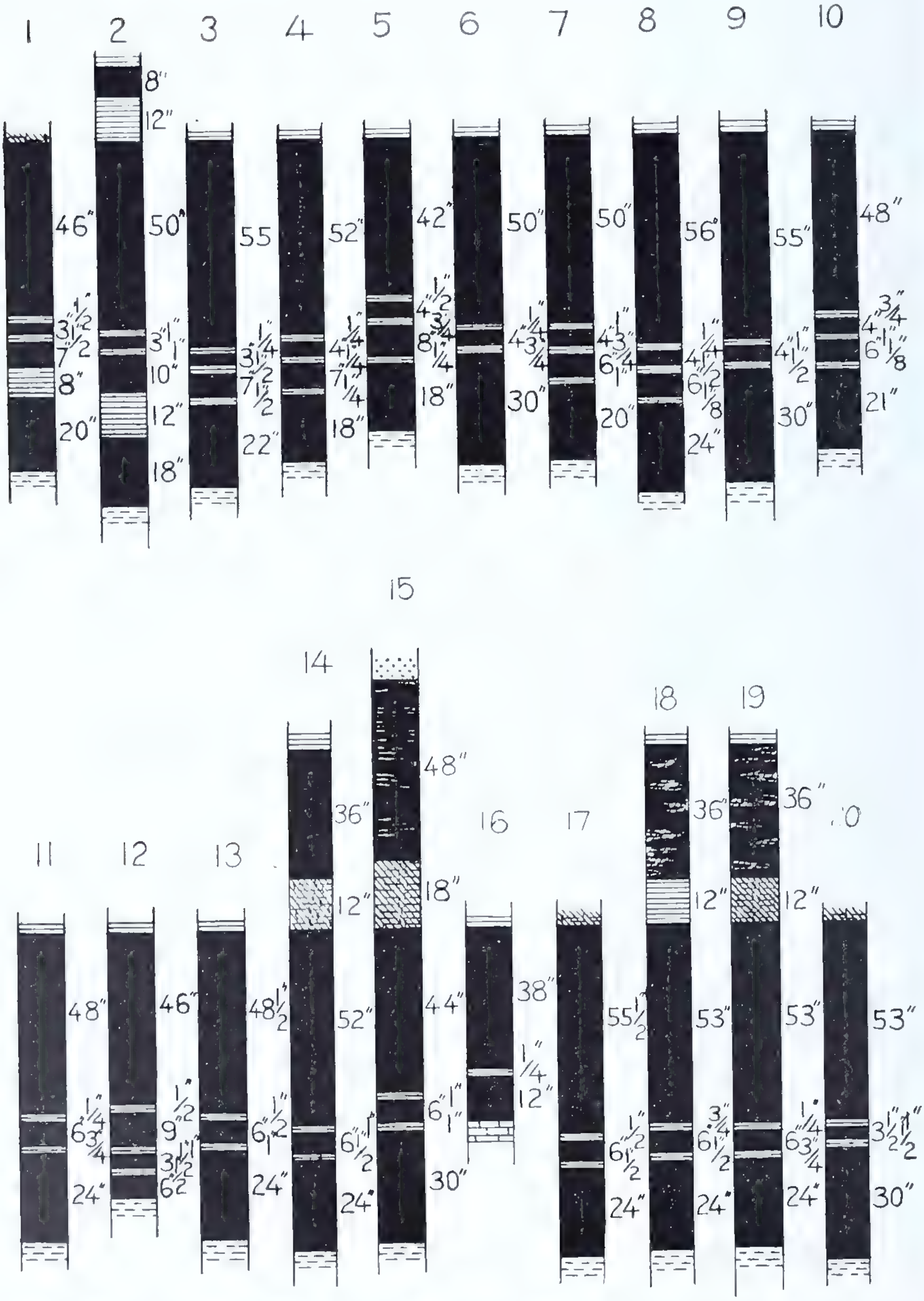


Figure 147. Sections of Pittsburgh coal in Greensburg Basin, Westmoreland County.

1. Wm. Penn Coal Company. William Penn mine, on northern turnpike on Boat Yard Run, 2½ miles northeast of New Alexandria, Derry township.
2. New Alexandria Coke Company. New Alexandria No. 5 mine, 2½ miles northeast of New Alexandria and 1 mile north of northern turnpike, Derry township.
3. Keystone Coal & Coke Company. Huron mine at Dundale, end of P. R. R. branch west of Loyalhanna Creek, Salem township.
4. Keystone Coal & Coke Company. Salem mine, at Allsworth Station on Alexandria branch of Pennsylvania Railroad, near Shieldsburg, Salem township.

5. J. P. Eidemiller & Son. Eidemiller mine, 1 mile northeast of Crabtree on Crabtree Creek, Salem township.
6. Donohoe Coke Company. Donohoe mine, on Crabtree Creek, ¾ mile east of Crabtree, Salem township.
7. Keystone Coal & Coke Company. Crabtree No. 4 mine, at Crabtree, Unity township.
8. Keystone Coal & Coke Company. Hannastown mine, at Hannastown, Salem township.
9. The Triangle Coal Company. Bennett mine, on Little Crabtree Creek, 2 miles north of Donohoe Station, Hempfield township.
10. Keystone Coal & Coke Company. Luxor mine, at Luxor, 1½ miles north of Donohoe Station, Hempfield township.
11. Keystone Coal & Coke Company. Crows Nest mine, at Bovard, Hempfield township.
12. Jacob Funk mine, on Greensburg-Unity road ½ mile southeast of Jacks Run and 1¼ miles southeast of Greensburg court house, Hempfield township.
13. Keystone Coal & Coke Company. Highland mine, 1¼ miles northeast of Greensburg, Hempfield township.
14. Prospect Coal Company. Prospect mine, at Radebaugh, 2 miles west of Greensburg, Hempfield township.
15. Greensburg Coal & Coke Company. Hawksworth mine, on Pennsylvania Railroad, 1 mile west of Greensburg Station, Hempfield township.
16. Keystone Coal & Coke Company. Greensburg No. 5 mine, at Carbon, 1 mile southwest of Greensburg, Hempfield township.
17. Keystone Coal & Coke Company. Greensburg No. 1 mine, ¼ mile north of Huff, Hempfield township.
18. Valley Coal Company. Kilgore mine, between P. R. R. and Jacks Run at south edge of Greensburg, Hempfield township.
19. Daniels and Goldberg mine, 1 mile southwest of Swede Hill, Hempfield township.
20. Wm. H. Maxwell mine, ¾ mile southwest of Fosterville, Hempfield township.

Irwin basin. The Pittsburgh coal has been the most important bed in the Irwin basin in Westmoreland County for many years, and is now approaching complete exhaustion. It is the standard gas coal of western Pennsylvania, and is used with great success as a steam and by-product coking coal.

The bed is in two divisions, as in the Latrobe basin. The upper division is composed of alternating bands of coal and clay, and is too impure to be mined. It is separated from the lower division by 10 to 12 inches of clay.

The lower division of the Pittsburgh coal averages 6 feet 6 inches thick in the Irwin basin of Westmoreland County. It is divided into four benches by thin bony coal partings. The top bench is called the breast coal, and is from 3 feet 6 inches to 4 feet thick; a thin bone parting separates the breast coal from the bearing-in bench, which is from 4 to 6 inches thick. The brick coal is about 18 inches thick, and is separated from the bearing-in coal and the bottom coal by thin bone partings. The bottom coal is impure, and rarely mined.

The lower division of the Pittsburgh coal averages 6 feet 4 inches thick in the townships north of the main line of the Pennsylvania Railroad, but thins to an average of 5 feet 10 inches in the townships south of the main line. In the southern and western parts of South Huntingdon township, it locally averages 7 feet 1 inch thick.

The Pittsburgh coal in the Irwin basin is soft and friable. It ranges from 32 to 36 per cent volatile matter, averaging 33 per cent; 53 to 58 per cent fixed carbon, averaging 56 per cent; 6 to 9 per cent ash, averaging 7.5 per cent; 0.8 to 1.5 per cent sulphur, averaging 1 per cent.

The Pittsburgh coal is mined in the vicinity of Fairbanks and Elrico in Loyalhanna township. It usually occurs in four benches, the entire bed aggregating approximately 7 feet thick. The shale partings are usually less than 1 inch thick, and occur at various intervals in the bed.

The Pittsburgh bed is mined extensively in the vicinity of Slickville in Salem township. The bed varies much in physical character.

At Export the Pittsburgh bed averages 6 feet 3 inches thick. It occurs in three benches separated by shale partings usually ½ to 1 inch thick. The top bench ranges from 3 feet 9 inches to 4 feet thick, the middle bench from 1 to 5 inches, and the bottom bench from 18 inches to 1 foot 10 inches thick.

The Pittsburgh bed is being mined on Byers Run, and in the vicinity of Pleasant Valley and Paintertown in Penn township. The physical character is much the same as that in the vicinity of New Salem and Export.

The Pittsburgh bed is very persistent in physical character in North Huntingdon township where the top bench ranges from 3 feet 4 inches to 3 feet 10 inches thick. The bearing-in bench is usually 4 inches thick with ½-inch shale partings above and below it. The bottom bench ranges from 1 foot 10 inches to 2 feet 4 inches thick.

The Pittsburgh bed is mined extensively in Hempfield township, where it characteristically occurs in three benches. The top bench averages 3 feet 8 inches thick, and ranges from 3 feet 4 inches to 3 feet 10 inches. The bearing-in bench is 4 to 5 inches thick with thin shale partings above and below it. The bottom bench averages 2 feet thick. Locally an additional thin bone parting separates the top bench into two minor benches.

The Pittsburgh bed is mined extensively in Sewickley township. Without variation it occurs in three benches. The top bench ranges from 3 feet 2 inches to 3 feet 9 inches thick. The bearing-in bench is 4 inches thick with thin bone partings above and below it. The bottom bench averages 2 feet thick.

The top bench of the Pittsburgh thickens in South Huntingdon township, and ranges from 3 feet 10 inches to 5 feet 1 inch thick. The bearing-in and bottom benches have practically the same thickness as in Sewickley township.

Rostraver township. The Pittsburgh bed has been mined for many years in Rostraver township. The coal is shipped both by river and by rail. The top bench ranges from 3 feet 2 inches to 4 feet 10 inches thick. The bearing-in bench is 3 inches thick, and has thin bone partings above and below it. The bottom bench ranges from 2 feet to 2 feet 8 inches thick.

The Pittsburgh rider coal, which directly overlies the Pittsburgh bed, locally is over 2 feet thick, but is very shaly. It is never mined and gives little promise of future utilization.

The Pittsburgh coal has the following sections in the Irwin Basin.

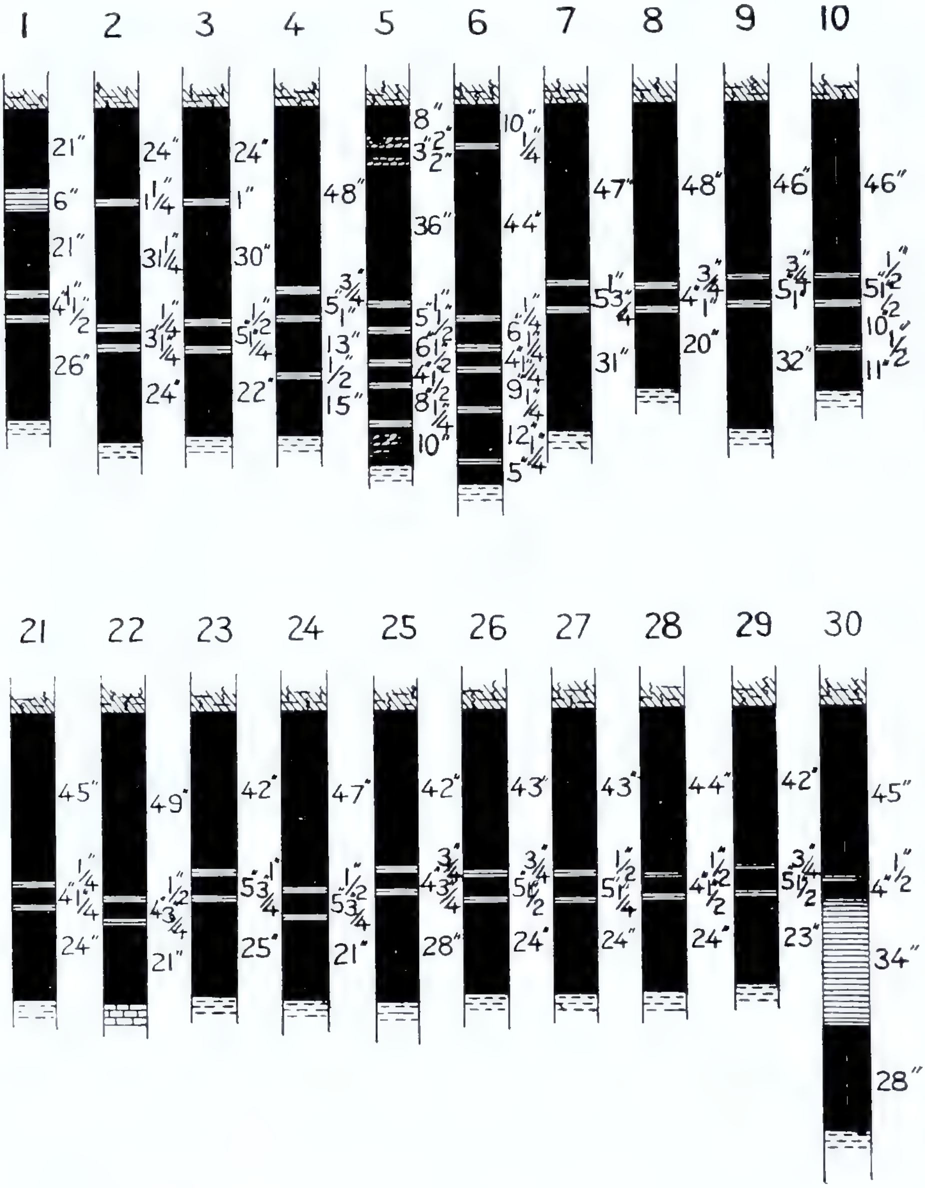


Figure 148. Sections of Pittsburgh coal in Irwin Basin, Westmoreland County.

1. Saltsburg Gas Coal Company. Helen No. 2 mine, 1 mile northeast of Fairbanks, Loyalhanna township.
2. Seehart Coal Company. Seehart mine, ½ mile southeast of Fairbanks and ¾ mile west of Loyalhanna Creek, Loyalhanna township.
3. Howard Gas Coal Company. Louise No. 1 mine, at Louise, 1½ miles southwest of Fairbanks, Loyalhanna township.
4. Irwin Gas Coal Company. Irwin Gas No. 4 mine, ⅕ mile east of Elrico Station on Turtle Creek branch of P. R. R., Loyalhanna township.
5. Irwin Gas Coal Company. Irwin Gas No. 3 mine, ½ mile northeast of Slickville, Salem township.

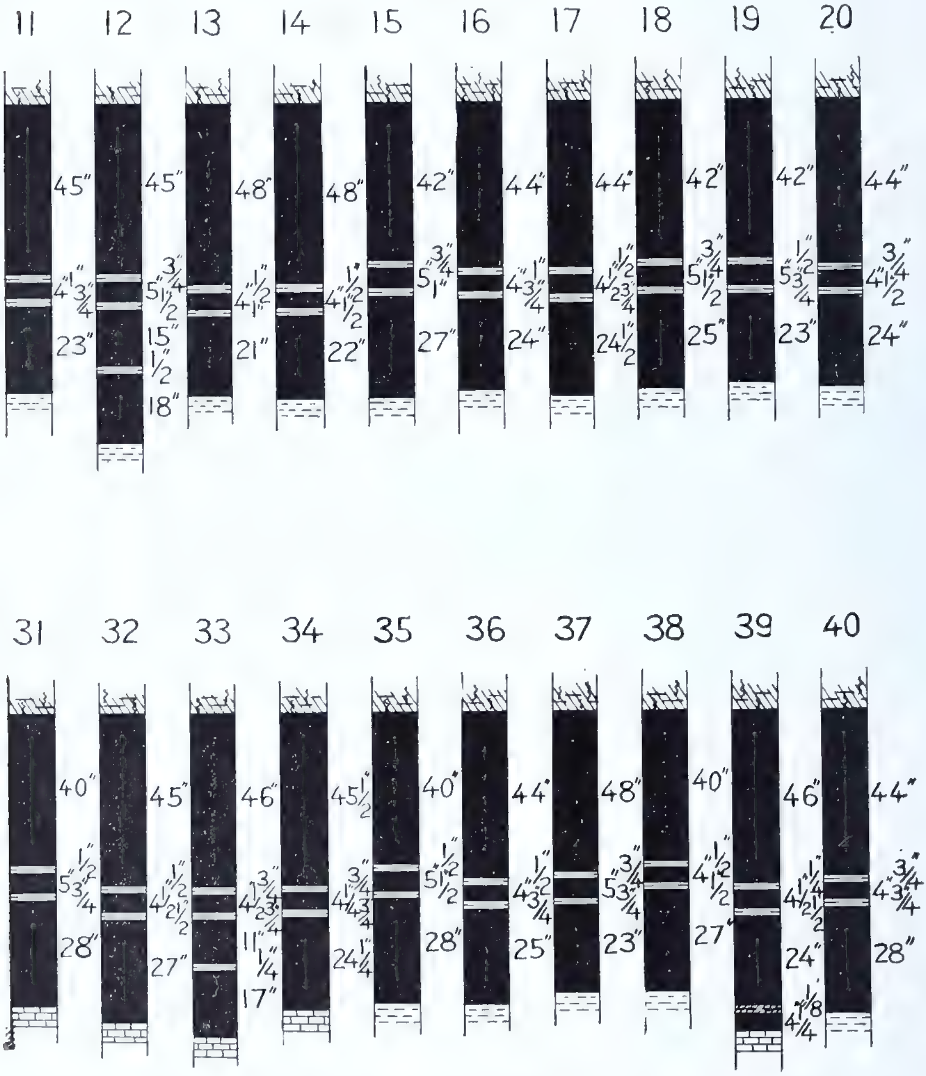


Figure 149. Sections of Pittsburgh coal in Irwin Basin, Westmoreland County.

6. Bethlehem Mines Corporation. Slickville mine No. 91-3, at Slickville, Salem township.
7 Irwin Gas Coal Company. Irwin Gas No. 5 mine, 1¼ miles southwest of Slickville, Salem township.
8. Delmont Gas Coal Company. Delmont Gas No. 4 mine, on south bank of Beaver Run at Trees Mills Station, Turtle Creek branch of P. R. R., Salem township.
9. Irwin Gas Coal Company. Irwin Gas No. 6 mine, 1½ miles north of Delmont and 1 mile east of Thorn Run, Salem township.
10. Delmont Gas Coal Company. Delmont Gas No. 3 mine, at Delmont Station on Turtle Creek Branch of P. R. R., Franklin township.
11. Trafford Coal Company. Star mine, ½ mile east of Export Station, Franklin township.
12. Westmoreland Coal Company. Export Nos. 1 and 2 mines, at Export, Franklin township.
13. W. B. Skelley Coal Company. Elizabeth mine, ¼ mile west of Export Station, Franklin township.
14. Camberdif Coal Company. Kathryn mine, ¾ mile southwest of Export, Franklin township.
15. Irwin Gas Coal Company. Irwin Gas No. 2 mine, 2½ miles southwest of Export, near source of Lyons Run, Franklin township.

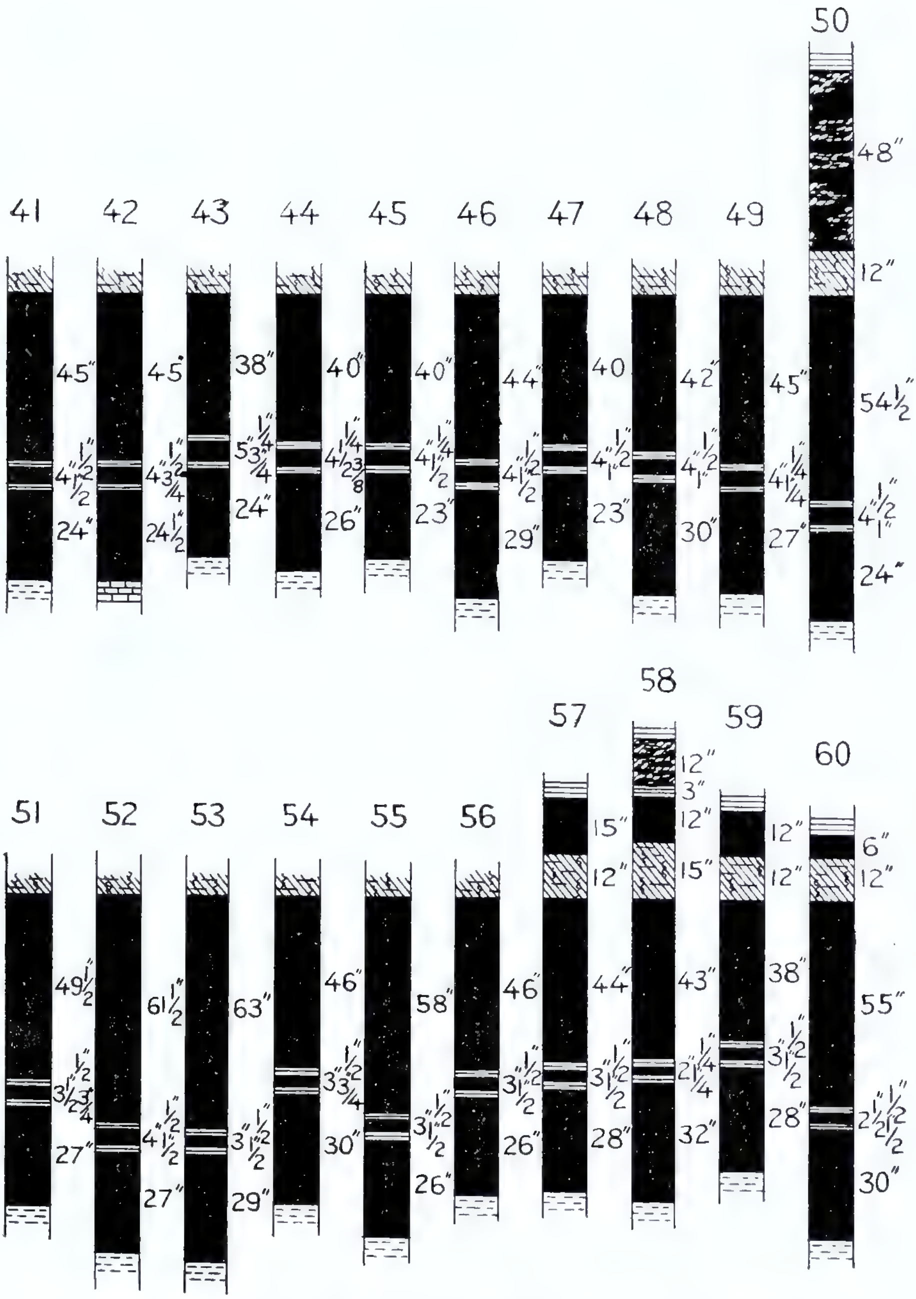


Figure 150. Sections of Pittsburgh coal in Irwin Basin, Westmoreland County.

16. Edwards Coal Company. Edwards No. 2 mine, 1 mile north of Pleasant Valley on east side of Byers Run, Penn township.
17. Hilda Coal Company. Hilda mine, 3 miles west of Harrison City and 1 mile southwest of Pleasant Valley, Penn township.
18. John Carr & Sons. Carr mine, 1 mile north of Paintertown, Penn township.
19. John S. Carr. Hawk mine, ½ mile southwest of Paintertown and west of Coal Run, Penn township.
20. Bald Eagle Coal Company. Bald Eagle mine, ¼ mile west of North Irwin, Penn township.
21. Union Coal & Coke Company. Penn Manor No. 1 mine, on Brush Run, ½ mile northeast of Manor, Penn township.

22. Westmoreland Coal Company. McCullough mine, 2 miles north of Manor near Harrison City, Penn township.
23. Union Coal & Coke Company. Penn Manor No. 5 mine, at Clarks Crossing on Brush Run, Penn township.
24. Westmoreland Coal Company. Denmark mine, at Claridge, on Brush Run, Penn township.
25. Claridge Coal Company. Kew mine, 1 mile northeast of Claridge, on Brush Run, Penn township.
26. Karl D. Weston. Weston mine, ¾ mile west of Stewartsville south of Lincoln Highway, North Huntingdon township.
27. G. V. Exton Coal Company. Lincoln mine, at Stewartsville, North Huntingdon township.
28. Byerly Gas Coal Company. Byerly mine, ¼ mile west of Circleville, North Huntingdon township.
29. Irwin Valley Gas Coal Company. Colinear mine, on south bank of Brush Creek, ½ mile west of Larimee, North Huntingdon township.
30. Westmoreland Coal Company. South Side mine, ¼ mile west of Irwin, North Huntingdon township.
31. Westmoreland Coal Company. Adams mine, ½ mile south of Irwin at Hahnstown, North Huntingdon township.
32. Westmoreland Coal Company. Biddle mine, at Biddle, 1 mile east of Irwin, North Huntingdon township.
33. Westmoreland Coal Company. Penn mine, ¼ mile southwest of Penn Station, south of Brush Creek, Hempfield township.
34. Hillman Coal & Coke Company. Edna No. 1 mine, at Edna No. 1, 3 miles southeast of Irwin, Hempfield township.
35. Edward Tomajko. Little Gem mine, 1½ miles southwest of Adamsburg, Hempfield township.
36. Ocean Coal Company. Ocean No. 2 mine, 1 mile south of Edna No. 2 and 1¼ miles northwest of Darragh, Hempfield township.
37. Keystone Coal & Coke Company. Arona mine, on north bank of Little Sewickley Creek, between Darragh and Arona, Hempfield township.
38. J. L. Kendall. Hillside mine, on hillside, ⅛ mile southwest of Arona, Hempfield township.
39. Hillman Coal & Coke Company. Keystone Shaft, at Andrews Run Junction, ½ mile east of Herminie, Sewickley township.
40. Keystone Coal & Coke Company. Keystone Shaft, at Andrews Run Jct., ½ mile east of Herminie, Sewickley township.
41. Ocean Coal Company. Ocean No. 1 mine, at Herminie, Sewickley township.
42. Westmoreland Coal Company. Criterion mine, 3½ miles south of Irwin near Rillton, Sewickley township.
43. Pittsburgh Coal Company. Shanor mine, ½ mile northeast of Guffey Station in Possum Hollow, Sewickley township.
44. Star Fuel Company. Bigley mine, at Guffey, Sewickley township.
45. Pittsburgh Coal Company. Ocean No. 1 mine, at Scott Haven, Sewickley township.
46. Westmoreland Coal Company. Marchand mine, at Lowber, on Youghiogheny branch of P. R. R., Sewickley township.
47. Sutersville Coal Company. Corrado mine, at Sutersville, Sewickley township.
48. Westmoreland Coal Company. Yough mine, on west bank of Sewickley Creek, ¾ mile north of Gratztown, Sewickley township.
49. Pittsburgh Coal Company. Yough slope, on east bank of Monongahela River, 1 mile north of West Newton, South Huntingdon township.
50. Whyel Coke Company. Oakridge mine, at Yukon, Sewickley township.
51. Pittsburgh Coal Company. Euclid mine, on east bank of Monongahela River at Fitzhenry, South Huntingdon township.
52. Pittsburgh Coal Company. Waverly mine, at Smithton, South Huntingdon township.
53. Pittsburgh Coal Company. Eureka mine, 1 mile southeast of Smithton, South Huntingdon township.
54. Pittsburgh Coal Company. West Newton mine, on Monongahela River opposite West Newton, Rostraver township.
55. Pittsburgh Coal Company. Banning No. 3 mine, at Jacobs Creek, Rostraver township.
56. Pittsburgh Coal Company. Equitable mine, in Webster Hollow, 1 mile east of Webster, Rostraver township.
57. Monessen Coal & Coke Company. Monessen mine, on east slope of Monongahela River, 2 miles northeast of Monessen, Rostraver township.
58. Manor Coal Company. Manor mine, in city of Monessen, Rostraver township.
59. Victoria Coal Company. Victor mine, on township road, ½ mile north of Belle Vernon, Rostraver township.
60. Pittsburgh Coal Company. Somers No. 4 mine, 1 mile northeast of Belle Vernon, Rostraver township.

REDSTONE COAL.

The Redstone bed lies about 65 feet above the Pittsburgh bed. It has been mined extensively for house fuel, and during war time for shipping coal. In 1924 it was mined for shipment in a few places. Its occurrence is restricted to the hills in the basins. North of the main line of the Pennsylvania Railroad the coal is very thin and is entirely lacking in large areas. It averages less than 2 feet thick, but it thickens south toward Youghiogheny and Monongahela rivers, and in some places is over 5 feet. The coal is generally good, and the bed is free from partings, with the exception of a local 3-inch clay band near the top. Roof and bottom rolls are common. The Redstone coal probably is thickest and best in the townships south and southwest of Greensburg.

A number of small mines are working the Redstone in Hempfield township. In the vicinity of Carbon and Huff it occurs in a single bench 4 feet 4 inches to 4 feet 8 inches thick. At Swede Hill it is separated into two benches by a shale parting 13 inches thick. The top bench averages 2 feet 4 inches thick, and the bottom bench 12 inches thick. In the vicinity of Radebaugh the bed occurs in a single bench 3 feet 2 inches thick; at Dick the bed is 4 feet thick. In the vicinity of Darragh the coal usually occurs in two benches separated by a clay parting 3 inches thick. The top bench, which is locally bony where thinnest, ranges from 6 inches to 2 feet 9 inches thick. The bottom bench ranges from 3 feet 6 inches to 4 feet 1 inch thick. At Adamsburg the top bench is 2 feet 6 inches thick, and is separated from a bottom bench, 2 feet thick, by a shale parting ½ inch thick. At Madison the bed generally occurs in a single bench approximately 4 feet thick. Locally two thin shale partings separate the bed into three benches.

The Redstone coal is mined at numerous localities in Sewickley township. At Wyano it occurs in two benches separated by a shale parting 1 inch thick. The top bench is 2 feet 5 inches thick, and the bottom bench 12 inches thick. At Scott Haven the coal occurs in one bench 4 feet 2 inches thick. At Smithton the coal is thinner, where it occurs in a single bench. Opposite West Newton the bed is 4 feet 4 inches thick.

The Redstone is being commercially mined at one locality in East Huntingdon township in the vicinity of Mount Pleasant. The coal is 3 feet thick and is overlain by 16 inches of bony coal.

At Mount Joy, in Mount Pleasant township, the coal is 3 feet 11 inches thick.

The Redstone is mined at Brinkerton in Unity township. The bed is 3 feet 6 inches thick, including a 2-inch shale parting 14 inches above the bottom.

The following sections are typical of the Redstone coal in Westmoreland County.

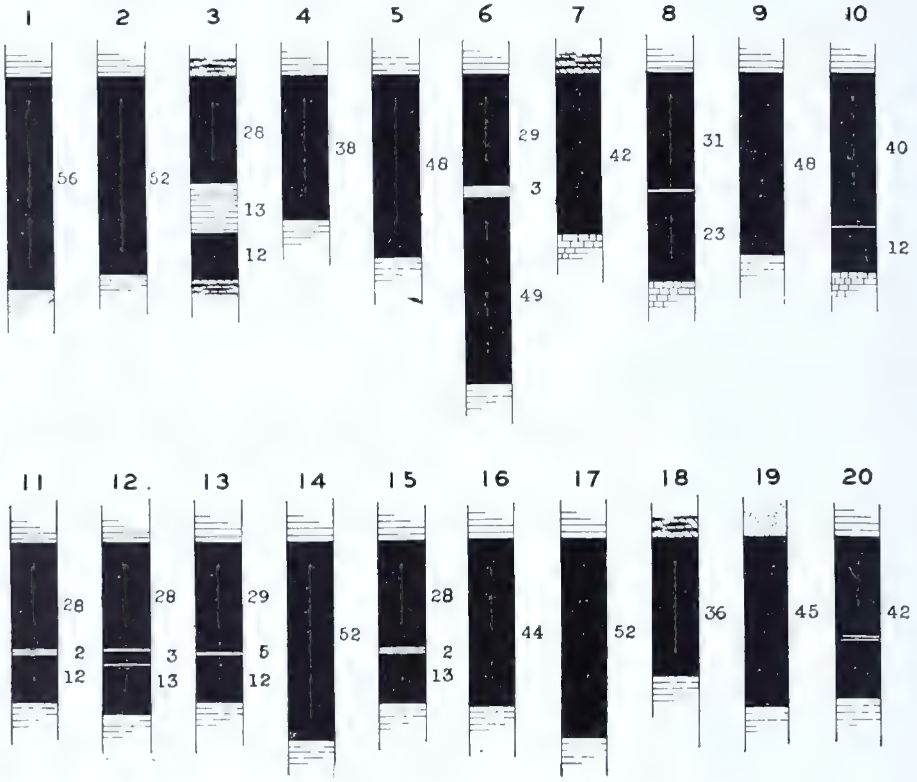


Figure 151. Sections of Redstone coal in Westmoreland County.

1. Outcrop near Carbon, Hempfield township.
2. Keystone Clay Products Company, at Huff, Hempfield township.
3. Henderson mine, at Swede Hill, Hempfield township.
4. Outcrop on Lincoln Highway, east of Radebaugh, Hempfield township.
5. Outcrop, 1 mile west of Dick, Hempfield township.
6. Outcrop, 1½ miles south of Darragh, Hempfield township.
7. Eisaman Coal Company. Betty mine, ½ mile south of Darragh, Hempfield township.
8. Edward Tomajko mine, at Adamsburg, Hempfield township.
9. Eisaman mine, south of Madison Station, Hempfield township.
10. Keystone Coal & Coke Company. Greensburg No. 5 mine, at Carbon, Hempfield township.
11. Oakdale Coal Company. Bertha mine, near Wyano, Sewickley township.
12. Yukon Coal Company. Madison mine, near Madison, Sewickley township.
13. Atlantic Fuel Company. Commercial mine, near Wyano, Sewickley township.
14. Leroy Coal Mining Company. Gilbert mine, ¾ mile north of Scott Haven.
15. Rutherford & Bovard. Rex mine, near Wyano, Sewickley township.
16. Wineland-Gilmore Coal & Coke Company. Juliet No. 1 mine, on B. & O. Railroad south of Smithton.
17. Hart-Markle Coal Mining Company. Markle mine, on Youghiogheny River opposite West Newton.
18. H. C. Frick Coke Company. King mine, 1 mile west of Mt. Pleasant, East Huntingdon township.
19. Brush Run Mining Company. Mitchell mine, 2 miles northeast of Mt. Pleasant, and 1 mile northwest of Mt. Joy, Mt. Pleasant township.
20. Mill Conn Coal Company. Brinker Run mine, at Brinkerton, Unity township.

SEWICKLEY COAL.

The Sewickley coal has an average interval of 140 feet above the Pittsburgh bed in Westmoreland County. It is very dirty, and is restricted to the hilltops of the Greensburg basin and near Edna No. 1 mine, Hempfield township, in the Irwin basin. It has never been mined.

BENWOOD COAL.

The Benwood coal, lying between the benches of the Benwood limestone in the Greensburg and Irwin basins, averages about 12 inches thick, and has been opened near Edna No. 1 mine in Hempfield township, where it is over 3 feet thick. The bed is lenticular and varies greatly in thickness within a few hundred feet.

UNIONTOWN COAL.

The Uniontown coal, occurring about 285 feet above the Pittsburgh bed, is thin in Westmoreland County. Probably it is thickest in townships bordering Monongahela River. It has been prospected, but its outcrop indicates that it is very impure.

WAYNESBURG COAL.

The Waynesburg bed is present in the townships bordering Monongahela River. Here it has a maximum thickness of 10 feet 6 inches and has been mined for local use. The coal is extremely impure and the bed carries many clay and bone partings. It is thinner on Sewickley Creek, but has better quality, and has been mined.

The principal importance of the Waynesburg is in Sewickley and Hempfield townships. It is being mined in the vicinity of Andrews Run in Sewickley township. It occurs in three benches, separated by bone and shale partings ranging from 2 to 10 inches thick. The top bench ranges from 10 to 12 inches thick, the middle bench 2 feet 2 inches to 2 feet 5 inches, and the bottom bench 9 to 18 inches thick.

The Waynesburg is also mined in the vicinity of Darragh in Hempfield township. It has the same physical character as in the vicinity of Andrews Run Junction.

The following sections are typical of the Waynesburg coal in Westmoreland County.

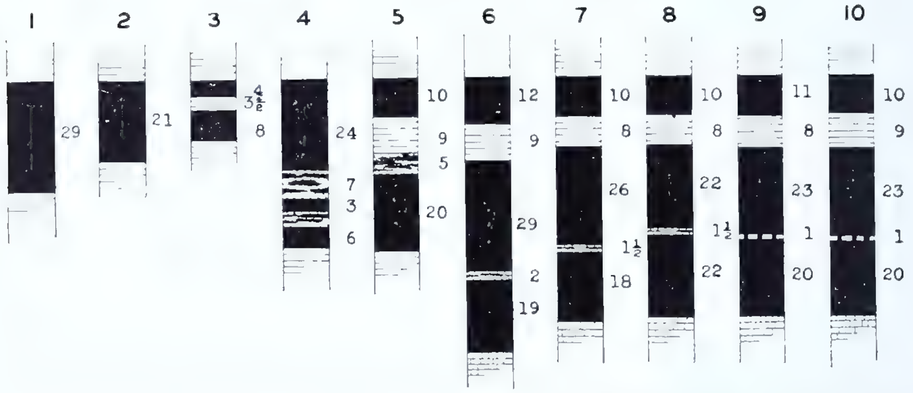


Figure 152. Sections of Waynesburg coal in Westmoreland County.

1. Outcrop 1 mile southeast of Circleville, North Huntingdon township.
2. Outcrop 1 mile west of Chambers, North Huntingdon township.
3. Outcrop 1½ miles southwest of Rillton, Sewickley township.
4. Outcrop near Edna No. 2 mine, Hempfield township.
5. J. Lintner farm, 1 mile south of Edna No. 2 mine, Hempfield township.
6. Fair Haven Coal Co. Herminie mine, at Andrews Run Junction, Sewickley township.
7. Evanstown Coal Co. Howell mine, 1 mile north of Andrews Run Junction, Sewickley township.
8. Kensington Coal Co. Rainbow mine, on Andrews Run, 1 mile north of Darragh, Hempfield township.
9. National Coal & Coke Co. Edwards No. 4 mine, 1¼ miles north of Darragh on Andrews Run, Hempfield township.
10. Watson Fuel Co. Watson mine, 1½ miles north of Darragh on Andrews Run, Hempfield township.

WASHINGTON COAL.

The Washington coal is present only in the highest hilltops in the southern part of the Irwin Basin. The coal is soft and impure. It has been opened by farmers but probably will never be mined extensively.

CHAPTER XXV.

CRAWFORD, VENANGO, FOREST, WARREN, McKEAN, POTTER, AND BRADFORD COUNTIES.

INTRODUCTION.

These counties comprise the northern outcrop of the main bituminous coal field of Pennsylvania. The principal coal-bearing groups of the Pennsylvania system have been eroded. Practically all of the coal produced in these counties is for domestic fuel and is not loaded for shipment. Most of it has been used for boiler fuel in drilling for oil and gas.

CRAWFORD COUNTY.

Crawford County has practically no workable coal. The Allegheny and higher coal-bearing groups are lacking. The Sharon coal in the Pottsville series, the only bed present, is confined to a few high hills in the southern townships. It is locally 4 feet thick, is variable and dirty, and under such thin cover that it has little or no value.

VENANGO COUNTY.

The lower part of the Allegheny group and the Pottsville series, containing several thin and dirty coal beds, outcrop in the tops of the knobs in the southern part of Venango County. The Middle and Lower Kittanning, Clarion, and Mercer coals are present, but none of them exceeds 2 feet in thickness. They are extremely impure, and only one, the Clarion, has been opened. This coal was used for raising steam in drilling oil wells.

FOREST COUNTY.

The rocks of Forest County lie practically flat, and the Pottsville series forms a broad plateau, which is deeply entrenched by streams.

About 60 feet of the lower part of the Allegheny group is present in a few of the high hills through the middle of Jenks township in the southeastern part of the county. These hills contain the Clarion coal, which is locally 2 feet 3 inches thick.

The Mercer (Alton) coals are represented by one or two beds of shaly coal that are locally 3 feet thick, and underlie the higher summits east of Allegheny River.

The Sharon (Upper Marshburg) coal is generally a dirty, split bed about 3 feet thick, underlying most of the higher areas.

Coal has not been mined on a commercial scale in the county, as the coals have little value at present.

WARREN COUNTY.

The coal-bearing rocks of Warren County consist of the basal sandstones of the Pottsville, which cap the highest points in the southern half of the county. These rocks contain two coals. The upper one, a few feet above the Sharon coal, is thin, averaging less than 12 inches thick, and is very dirty. The Sharon coal averages 2 feet thick, has fair quality, and has furnished much fuel for local use. The roof is taken down for height.

McKEAN COUNTY.

McKean County is topographically a high plateau, much dissected by streams. The coal-bearing rocks, the Allegheny and Pottsville, occur in small, isolated areas in the highest points on this plateau.

COALS.

SHARON (UPPER MARSHBURG) COAL.

The Sharon coal, lying about 125 feet below the top of the Pottsville conglomerate, has been opened at many places in the Alton and Clermont basins. It averages less than 2 feet thick, and is dirty.

MERCER (ALTON) COAL GROUP.

Three coals, lying at the horizon of the Mercer coal, are the most extensive and important coals in the county.

The lower coal is thickest in the eastern part of the county. It has been opened at Hamlin, Splint, and Lyman Camp mines, where it averages 4 feet thick. The roof and floor are very rolly, sometimes cutting out the bed entirely.

The middle coal is generally composed of two to four benches separated by shale partings. It has been mined at Alton, Lafayette township, where it ranges from 4 to 8 feet thick, including partings. This is a very unusual thickness.

The upper coal ranges from 2 feet to 3 feet 6 inches thick, and is generally one bench, although locally the bed is full of thin bone partings. This coal was worked many years ago at Buttsville, and near Clermont, but the openings are now fallen shut.

CLARION (CLERMONT, A) COAL.

The Clarion coal, lying from 60 to 70 feet below the Lower Kittanning, has been mined in Sergent and Norwich townships, but the openings are now abandoned. It is reported 4 feet thick on the head of Indiana Run. In the Clermont basin it is 2 feet 4 inches to 3 feet 6 inches thick; it is hard and brittle, high in ash and sulphur, and is nearly 40 per cent volatile matter.

In Davis Hill, Lafayette township, the bed is 3 feet 6 inches to 5 feet thick, with a local parting near the top. The bed is present in several other townships, but averages less than 2 feet thick.

LOWER KITTANNING (DAGUS, B) COAL.

The Lower Kittanning coal underlies about fifty acres in the Clermont basin, and a few isolated areas in the Norwich basin. It ranges from 2 feet 6 inches to 3 feet thick, and has fair quality. It is not mined at the present time because roof and bottom rolls and its limited area make mining unprofitable.

POTTER COUNTY.

Four or five synclinal basins which cross Potter County in a general northeast-southwest direction, contain a few isolated areas of Allegheny and Pottsville coals. The basal sandstones of the Pottsville make broad table lands, and only the highest hills contain the coal beds.

The Kettle Creek basin is a shallow trough midway between the Blossburg and Gaines coal basins of Tioga County, which spoon out just beyond the Potter County line. This basin has preserved a few acres of coal in a hilltop near Germania, Abbott township. The coal has been mined for local use.

The Pine Creek basin of Potter County is a prolongation of the Gaines basin of Tioga County. A coal bed 3 feet 2 inches thick has been opened on Wittenmore Run. It is hard, clean coal, carrying sulphur 0.9 per cent; ash 9.8 per cent; volatile matter 30.9 per cent. The coal is excellent for steaming and domestic use.

Other basins contain a few isolated areas of inferior coal in the highest hilltops.

BRADFORD COUNTY.

The coal-bearing groups of Bradford County are confined to the Barclay basin in Barclay and Leroy townships. There are possibly 30,000 acres in the field, which contains the Lower Kittanning and Brookville coals. The production is small, and at the present time none of the mines are working.

The Barclay basin is served by the Susquehanna and New York Railroad.

COALS.

The Brookville coal, lying from 60 to 80 feet below the Lower Kittanning coal, ranges from 12 inches to 3 feet 6 inches thick. It locally has an 8-inch shale parting in the middle, in addition to numerous knife blades of bone. Locally the coal is canneloid in physical character, but generally it is tender and breaks into long sticks.

The Brookville coal belongs to the semi-bituminous type. The percentage of water is 0.85; volatile matter 16.6; fixed carbon 67.2; sulphur 0.5; ash 14.7.

Lower Kittanning (B) Coal.

The Lower Kittanning is the most important coal in the Barclay basin, and yields nearly the total production. Its area is smaller than that of the Brookville.

The Lower Kittanning coal is generally a triple bed, consisting of three benches of coal, separated by shale partings, ranging from 2 to 8 inches thick. The lower bench ranges from 10 inches to 3 feet thick, and is friable, columnar in structure, and deep black in color. The middle bench ranges from 4 to 18 inches thick, and is also soft and friable. The top bench ranges from 16 inches to 2 feet thick, and is harder, and does not break up when mined.

The Lower Kittanning coal averages 17 per cent volatile matter, 70 per cent fixed carbon, 0.8 per cent sulphur, and 10 per cent ash. The coal is excellent for steaming and smithing purposes.

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